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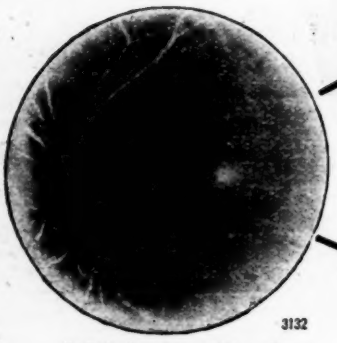
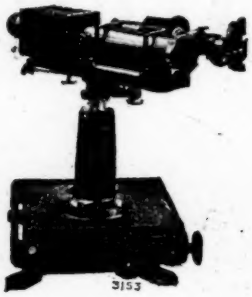


Ophthalmoscope Record: Normal Retina.



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A British Medical Association Lecture

ON

SOME CONSIDERATIONS OF IMMUNITY

FROM THE STANDPOINT OF GENERAL MEDICINE.*

BY

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THE subject of immunology has become one of the most technical and specialized in the whole field of medicine; and the general medical worker, in attempting to comprehend the principles and mechanism of immunity, must frequently be nonplussed by the complexity of data and intricacy of theory pertaining to this branch of medical knowledge.

If any justification is required for the subject of this lecture, it is the need for some review of immunity from the standpoint of everyday medicine. Experimental immunity has, of course, claimed primary attention with signally successful results, and highly important practical applications have arisen out of this work; but the subject of immunity should make an even more cogent appeal to the practitioner than that suggested by the successful application of experimental immunity.

Infective disease, as it occurs in man, is essentially a biological process which represents the predatory aggression of micro-organisms towards one of the higher animals in the natural struggle for existence; and just as all living things have adapted themselves to resist their aggressors, so immunity from infective disease is merely an adaptation which enables an animal to maintain its life in spite of the constant attack of micro-parasites. Thus the animal body has become provided in its physiological evolution with a normal immunity mechanism which affords it some relative protection from micro-organisms generally. This resistance in any species is greater towards some parasitic organisms than others; the former are usually incapable of attacking the tissues, the latter are the recognized pathogens for that species. Without this normal mechanism no animal could exist in our world, which abounds in microbe parasites.

Apart from purely biological considerations, we have only to reflect that recovery from microbic disease in the absence of a specific remedy, after the parasite has overcome the initial defences, depends on the farther adaptation of the immunity mechanism, that the fate of the individual is a function of this adaptation, and that the physician in directing the general treatment is empirically attempting to facilitate the process. This is only a reiteration of the Hippocratic doctrine of the *vis medicatrix naturae* with an immunological interpretation.

Thus the practitioner of medicine is in reality the best observer and recorder of the external manifestations of this mechanism, its initial failure evidenced by the occurrence of infection, its successful adaptation with recovery from the disease, and often, unfortunately, its second failure and the destruction of the host. The problems of immunity, therefore, are not matters for research and discussion by special workers in this branch only, but relate to the ordinary affairs of general medicine and surgery. The practitioner is just as much concerned with the mechanism of immunity as with that of the vascular system.

THE NORMAL DEFENCES.

The normal defensive system merits first consideration—that is, the means whereby infection is resisted without artificial intervention. It must be obvious that this function is a variable one—depending on race, family, sex, age, and individuality, and varying from time to time even in the same person as a result of known and unknown conditions that affect the individual. The occurrence of a rapidly fatal streptococcic septicaemia following even a minor superficial wound cannot always be explained on the basis of bacterial virulence, and is a striking demonstration of an adverse variation in resistance on the part of the individual. But even in these days of highly developed surgical technique and treatment one cannot but marvel at the natural immunity of the tissues following trauma; and it is well known how, in the case of certain epidemic diseases, a proportion of persons to whom the virus gains access actually resist infection, or at least the spread of the organism in the tissues—for example, epidemic cerebro-spinal meningitis. Microbic invasion of the tissues by those commensal but potentially pathogenic organisms that inhabit the skin and various body cavities is almost inevitably a frequent occurrence even in the normal person, but how infrequently does infection result in this way! The invading organism is rapidly destroyed and eliminated. On the other hand, in the case of a *B. coli* pyelitis, coliform bacilli invading the blood stream or lymphatics from the bowel have, in some way, overcome the natural defences and established themselves in the kidney.

It is apparent that further knowledge regarding the various influences affecting the normal immunity would be a great asset in preventive medicine.

The skin epidermis, with its thick and compact epithelium, is, in most cases, if intact, a mechanical obstacle to bacterial invasion. The epithelium of mucous membranes, however, does not provide this physical protection, though the mucous secretions exert an extremely important defensive function both mechanically and chemically. Thus the acid secretion of certain mucous membranes (for example, the stomach) is definitely antiseptic, and the importance of the acid factor in the gastric juice as a barrier to infection is not to be underestimated. For example, the likelihood of the typhoid bacillus passing the stomach is greater if the acid secretion is deficient owing to some condition interfering with the healthy function of the organ, or if the stomach is empty and the secretion is in abeyance (Cornwall and La Frenais).

Apart from chemical antiseptic effects, the secretions of the body possess definite bactericidal properties. The exact nature of these is not yet fully understood. An interesting contribution to our knowledge of this subject is due to Fleming, who has shown how various secretions and tissues contain a bacteriolytic agent ("lysozyme"). In any case interference with the normal secreting function of the mucous membranes means a distinct weakening in the body's defence.

In this connexion we have to consider the local resistance or susceptibility of particular superficial tissues towards certain bacteria, so that successful infection may only occur through definite avenues—for example, the mucosa of the genitals in the case of the *Spironema pallidum* and gonococcus (though extragenital infections are not infrequent), the mucosa of the nasopharynx in the case of the meningococcus, etc. The cholera vibrio injected subcutaneously is killed locally, and cannot attack the body by this avenue. The oesophageal mucosa is obviously resistant to the diphtheria bacillus. Pathogenic bacteria may exhibit a selective affinity for special tissues: the typhoid and dysentery bacilli both invade the body through the alimentary tract, but the former selects the lymphoid tissue of the small intestine, the latter the mucosa of the large bowel. Local tissue susceptibility, on the one hand, and resistance on the other, exert an important influence on the processes of disease.

Once the parasite passes the superficial barrier and enters the tissue spaces it has to encounter a continued resistance—the phagocytic action of the leucocytes, endothelial cells, and probably certain other cells, and also the bacteriotropic and bactericidal action of the blood plasma and lymph. Little need be said with regard to the power of the phagocytes to ingest and eliminate micro-organisms and other foreign substances—the phenomenon is so well known. But some reference may be made to the adverse properties of the blood plasma. It has long been known that normal blood serum exerts an effect on bacteria, rendering them more susceptible to phagocytosis, and this has been designated bacteriotropic or opsonic action. It is apparently due to an undefined labile constituent of the serum—normal opsonin—which has no direct influence on the vitality of bacteria, but plays an essential part in their destruction by leucocytes. Blood serum is also bacteriolytic or bactericidal, and this effect has been accepted as due to

* Delivered to the Dumfries and Galloway Division of the British Medical Association, September 25th, 1924.

an unstable substance designated alexin or bactericidal complement. This property of serum has attracted a considerable amount of attention in immunological study; but even now it is impossible to define the actual nature of complement. In many respects it resembles ferments, though it cannot be classified chemically in this way.

If the invading organisms are able to resist the immediate defences and establish for the time being a focus of infection, an inflammatory reaction may result in which larger numbers of phagocytic cells accumulate at the focus. These, along with the increased exudation of plasma, considerably reinforce the local resistance.

In analysing the initial struggle of a microbe to gain a foothold in the tissues the so-called aggressins have to be considered—that is, toxic substances produced by certain bacteria which are highly injurious to the leucocytes and so enable the invader to break down the first line of defence and increase its aggressiveness. This factor must seriously interfere with the local reaction, and the opsonin effect already referred to has been regarded by some immunologists as a neutralization of aggressin. Apart from phagocytosis, the tissue reaction affords an important protection. Thus the proliferation of fibrous tissue elements and the formation of granulation tissue walling off the focus are important protective factors. The barrier imposed by granulation tissue has been well exemplified in experiments with the tetanus bacillus and its toxin (Noetzl). Moreover, as is well known, a closed abscess may sterilize itself.

Natural immunity to particular infections may be due to the normal occurrence in the blood of specific substances antagonistic to the parasite or its toxin—that is, the so-called antibodies, which I shall refer to in more detail later. The best example of this in the human subject is the natural immunity possessed by some individuals to diphtheria, due to a specific diphtheria antitoxin in the blood. Its presence can be determined by the Schick test, where a small amount of diphtheria toxin is introduced intradermally, and the non-occurrence of a local inflammatory effect indicates the existence of this neutralizing substance in the blood. The opposite effect denotes susceptibility, and the reaction has come to be extensively applied in preventive work, as an indication of the need for prophylactic treatment. The genesis of this natural antitoxin is uncertain, though it may be the result of a previous unrecognized diphtheria infection.

Attention has been drawn quite recently to an analogous reaction ("Dick reaction") in the case of scarlatina, based on the assumption that this disease is produced by a haemolytic streptococcus present in the throats of infected persons. It has been found that filtrates from cultures of this organism, even in high dilutions, give a cutaneous reaction like the Schick test in persons apparently susceptible to scarlatina, while those who have passed through the disease yield a negative effect. Our knowledge of this subject is still incomplete, but there is promise of further developments in treatment by the preparation of a neutralizing antitoxin analogous to diphtheria antitoxin.

D'Herelle has indicated a further immunity factor, especially in relation to intestinal infections (for example, typhoid, bacillary dysentery)—the bacteriolytic principle regarded by him as representing an ultramicroscopic parasite of bacteria (bacteriophage). In his original observations he found that broth cultures of faeces, even from normal persons, contained a filterable principle which exerted a lytic or destructive action towards intestinal pathogens—for example, *B. dysenteriae*. Whether this principle represents a parasite of bacteria or an autolytic enzyme generated in the bacteria themselves is uncertain, though recent work rather favours the latter view. The possible part played by this agent in normal and acquired resistance to infection remains to be definitely ascertained. In any case, the subject adds interest to the whole question of immunity.

It must be remembered in any consideration of normal immunity that a great factor in infection is the dose of organisms introduced into the body. In view of the undoubted potentialities bacteria have for multiplication, it may have been thought at one time that a single bacterial cell entering the tissues would be sufficient to generate the corresponding disease. We know, however, from animal experiment, that a few bacteria injected into the body are readily disposed of by the normal defences. This function of dosage must be of the greatest importance in the genesis of disease in man. Small doses may be quite innocuous.

In studying immunity we must also consider the opposite condition, susceptibility, and the factors that predispose to infection by breaking down the normal resistance. This is a subject with which the practitioner of medicine must be familiar from his own personal experience, and merits more detailed study and analysis in general practice. Even the effects of various drugs on the normal and also the acquired immunity require investigation both from the clinical and experimental standpoints.

Acquired Immunity.

I have indicated the resistance a pathogenic microbe has to overcome before it can successfully establish itself in the tissues and some of the factors that influence this mechanism. The failure of such resistance permits the undisturbed proliferation of the organisms in the body. The existing mechanism, having failed to eliminate the parasite, requires reinforcement and further adaptation, for a much larger number of organisms have now to be destroyed if the host is to overcome the infection. In short, the struggle between parasite and host is continued with the intervention of an additional factor (or complex of factors)—acquired immunity, which means the development of new and specific resisting powers against the particular causal organism. On this factor depends the recovery of the individual in the absence of specific remedies.

The profound nature of this adaptation is evidenced by the fact that it may persist for long periods after recovery, even throughout life as in the case of small-pox. But the reverse is also true for some infections. The immunity may be transitory and decline soon after its function has been fulfilled, as in the case of pneumonia.

Acquired immunity may not always lead to the complete destruction of the causative organisms throughout the body—for instance, in tissues where for some reason the immunity influences do not affect the organisms present; it may be a "non-sterilizing" immunity, exemplified by the convalescent carrier. Thus in typhoid convalescents the bacillus may persist in the gall bladder, where it is apparently protected from antagonistic effects. Transitory non-sterilizing immunity is well seen in the case of the relapsing infections; the increased resistance resulting from the initial attack declines and the parasites still present in the body are no longer held in check, with the result that a recrudescence occurs. In the chronic infections a balance is established, the host being unable to eliminate the parasite, the latter being unable to destroy the host. In general, acquired immunity is highly specific for the particular virus and represents a special reaction on the part of the tissues to the invading organism or its products. Most of our immunological procedures are based on the specificity of acquired immunity.

Artificial immunization, which is the outcome of experimental immunology, represents the development of this highly specialized adaptation without the individual actually suffering from the particular disease, through inoculating the virus in such modified form that it is incapable of producing serious pathological effects (active artificial immunity). The adaptation can also be effected in some cases by injecting the blood serum of an actively immunized animal (passive immunity). Passive immunity obviously depends on the transference of new substances present in the blood of an immunized animal, which constitute the specific resisting mechanism—immune bodies or antibodies.

Active immunity is more lasting than passive immunity, owing to the fact that the tissues have increased their resistance and are producing antibodies by some intrinsic change, whereas in passive immunity antibodies are supplied without tissue activity. Active immunity is, however, slower in development. Thus the latter is mainly applicable where it is necessary to confer an immunity without delay for a short period, as in emergency pro-

phylaxis by diphtheria antitoxin. On the other hand, in the case of those likely to be exposed to diphtheria over a considerable period of time and exhibiting susceptibility to the Schick test, active immunization with diphtheria toxin neutralized with antitoxin ("toxin-antitoxin immunization") is indicated. The antitoxin in this case is merely introduced to obviate the injurious effects of the toxin. The thorough combined application of the Schick test and toxin-antitoxin prophylaxis has proved a valuable procedure in the prevention of diphtheria.

The phenomenon of passive immunity clearly proves that in some cases acquired resistance is due to serum antibodies. The properties of these substances have been extensively studied, but we still know little regarding the process of their development. Though they are demonstrable mainly in the blood they are essentially tissue derivatives, and result from some chemical interaction between the cell and the protein substances contained in the parasite or its products ("antigen"). It may be noted here that, apart from antibacterial immunity, other cells and substances act as antigens—for example, red blood corpuscles, blood serum, animal venoms, etc. Certain of these antibodies are effective by neutralizing the bacterial toxin, others are antibacterial or antagonistic to the bacteria themselves. The antibacterial antibodies are somewhat diverse in their action. One type may, under certain conditions, produce actual bactericidal effects, but certain antibodies do not directly affect the vitality of the microbe though producing obvious effects, such as clumping or agglutination. Moreover, bactericidal action by antiserums is not entirely due to the new substance but to the combined effect of the antibody and the normal alexin or complement of the serum. It has been claimed that the antibody sensitizes the organism, as it were, to the bactericidal complement and brings more complement into contact with the antigen than would occur without this intervention (Muir). Bactericidal action by immune bodies is therefore a complex process involving additional factors, and is not a direct effect as in the neutralization of toxin by antitoxin. While the passive immunity produced by the injection of diphtheria antitoxin and certain other antitoxic serums supplies striking proof of artificial immunization by antibodies, it must be acknowledged that animal serums containing other types of antibodies have proved less effective as therapeutic agents. It must be noted also that the obvious immunity reaction —which can be demonstrated *in vitro* by antibody effects, bacteriolysis, agglutination, etc.—may by no means represent the complete immunity mechanism. Unknown factors may contribute to acquired immunity. Immunity may occur in the absence of the recognized antibodies. Moreover, certain immunity reactions cannot be regarded as sure criteria of immunity. In fact, it has been suggested that antibody production may simply be a subsidiary result in the processes which underlie immunity (Browning). Thus the agglutinating antibody which clumps the homologous organism (agglutinin), being one of the most readily demonstrable of antibodies in laboratory experiment, has been accepted in the past as a criterion of immunity even from the quantitative standpoint; but there is now some disinclination to rely on this reaction as an index of immunity. While such antibodies may not correspond quantitatively to actual immunity, they are undoubtedly indicators of the reaction of the tissues to alien substances, which is the essence of acquired resistance. In the case of animals, of course, the sure test of acquired immunity, if carefully controlled, is by protection experiments, where the immunized animal is shown to possess a greater resistance than normal animals. This method is inapplicable in man, and we have to fall back either on statistical methods, which may introduce possible fallacies, or on the demonstrable immunity reactions, which are, quantitatively at least, uncertain indicators.

Apart from the immunity factors which bring about the destruction of micro-organisms, the occurrence of what has been called antiblastic immunity—that is, resistance due to inhibition of the growth of bacteria—merits some reference. Organisms invading the tissues utilize the available food material by their digestive enzymes, and this preparatory ferment action probably occurs at the surface of the bacterial cell. Any interference with this process would, of course, restrain growth and contribute to the elimination of the infecting microbe. In immunization neutralizing antibodies to the bacterial enzymes may be developed by the tissues, and these, by inhibiting the bacterial ferments, restrain the growth of the organism (Dochez and Avery).

Artificial immunization by vaccines, which are generally heat-killed artificial cultures, has come to be one of the standard procedures of general medicine for prophylaxis and treatment. Statistical proof has thoroughly established the vaccine prophylaxis of certain infections—for example, typhoid and paratyphoid fevers.

In the vaccine therapy of bacterial diseases, while the basic principle of the method is the same as in prophylaxis, the application is entirely different, and, though this form of therapy is recognized as effective in certain conditions, its failures are as obvious as its successes. The fundamental question is whether, in an infection where the tissues fail to respond to the immunizing influence of the living organisms present in the body, a subcutaneous injection of the same organism in dead artificial culture will bring about an effective specific response. The original idea that in certain chronic infections the immunizing substances of the organism were not absorbed and did not therefore provoke a general reaction, and that the vaccine would supply this want, must be seriously questioned. Vaccine therapy has usually been based on the principle of specificity, but it seems not unlikely that certain of the favourable results are due to a non-specific effect. This I shall refer to later.

Any detailed analysis of vaccine therapy is beyond the scope of this lecture, but there are certain important considerations in the specific immunizing properties of vaccines to which I might draw attention. The types of antibodies developed in response to a bacterial vaccine are, for the most part, antibacterial—bactericidal, bacteriotropic, and agglutinating—not antitoxic.

Vaccines of different organisms vary greatly in their antigenic effects as judged by antibody response. Thus a typhoid vaccine exerts a marked reaction, while the immunizing effect of the tubercle bacillus is relatively weak. The antibodies resulting from immunization also vary with different organisms. The typhoid bacillus incites the production of a specific bacteriolysin, agglutinin, opsonin, whereas, in the case of the staphylococcus, bacteriolysin production is practically absent. Bacterial species vary considerably in their immunizing properties. There is no uniformity in this respect.

We must remember that our methods of producing antibacterial immunity in man are far from fulfilling immunological ideals. Killed cultures are used for obvious reasons, but one can hardly compare the effect of injecting dead bacteria with the immunity following an actual infection. The maximum immunity or protection may only be produced by the introduction of the living virus, as has been shown experimentally in the case of certain organisms. This principle is fulfilled in the case of small-pox vaccination and antirabic vaccination. To produce immunity it may be necessary that the virus should be able to multiply to some extent in the tissues. It is likely that some bacteria only produce all their characteristic products when growing in the tissues and not in culture, and if immunity depends on a reaction to all the bacterial products killed cultures would not therefore supply the necessary stimulus. Moreover, the sterilization of cultures by heat or chemicals may destroy certain essential antigenic constituents or products.

The toxicity of vaccines is also an important practical consideration. This is well exemplified in the case of the dysentery bacilli, which are extremely toxic in vaccine form. Such effects limit the doses that can be conveniently given. Toxicity can, of course, be reduced by using sensitized vaccines (where the ordinary vaccine is treated with a specific antiserum). The so-called detoxicated vaccine, in the preparation of which the toxic element is removed by chemical separation, undoubtedly obviates this difficulty, but the antigenic value of such preparations seems doubtful (Davidson).

On general principles, therefore, it is essential, in order to produce the necessary stimulus, that the virus should differ as little as possible from its natural condition. Of course, the practical difficulties in achieving such an ideal are obvious.

DIAGNOSTIC APPLICATIONS.

One of the most interesting applications of immunology has been on the diagnostic side—that is, the use of *in vitro* antigen-antibody reactions in the recognition of infective conditions that cannot be diagnosed with certainty by clinical methods or by direct demonstration of the pathogenic agent. Their diagnostic value is a function of the specificity of antibodies for the homologous antigen, and depends on the fact that during the course of an infection these specific substances appear in the blood serum. Irrespective of whether antibodies are protective or not, they usually represent an obvious indication of the present or past occurrence of the particular organism in the body, and in this way their recognition can be utilized in diagnosis. Generally speaking, the test for an antibody depends on the availability of the homologous antigen. Thus the Widal reaction has been one of the practical results of the laboratory cultivation of the typhoid bacillus.

It has been noted how antibody production varies as a result of immunization. The same is true for the actual infection. This variation is both qualitative and quantitative. Thus the types of antibodies and their content in the serum vary considerably both in different infections and in individual cases of the same infection. The serological tests applicable in diagnosis depend on the types of antibodies developed in the particular disease, their recognizable effects on the antigen, and the facility and accuracy with which these effects can be demonstrated.

In a case of typhoid fever the following specific antibodies can be recognized under suitable conditions—bacteriolysin, agglutinin, precipitin, opsonin, and an antibody whose only obvious effect is that along with the antigen it has the power of absorbing from fresh serum the normal substance called complement already referred to (complement deviating antibody). Thus the reactions of any of these antibodies might be utilized in typhoid diagnosis. The demonstration of bacteriolysin is a complicated reaction; the opsonic test, though quite practicable, is subject to great personal error; the complement deviation reaction, though relatively easy to perform, necessitates an elaborate technique. On the other hand, the agglutination reaction is easily carried out, only two reagents entering into the reaction—the patient's serum and a suspension of the bacillus—and the test is quickly completed and the clumping or agglutination is obvious even to the naked eye. Agglutination tests are the simplest to perform of all the immunity reactions, and where agglutinating antibodies are developed the reaction has been successfully utilized in diagnosis—for example, in typhoid, paratyphoid, and undulant or Malta fever. In these conditions the agglutinin content of the serum may be considerable and the reaction is quantitatively delicate.

Of course, there must be an obvious demand on the clinical side for such an indirect diagnostic criterion. There is little necessity for a serological test in an infection which can be diagnosed by more direct methods. Thus the diagnosis of diphtheria, cerebro-spinal meningitis, etc., can be confirmed in the laboratory by demonstrating the causal organism in material from the case. Even in typhoid fever, if the case is met with early enough, the most direct method is the isolation of the bacillus from the blood, and indirect methods are unnecessary.

The Wassermann complement deviation reaction is one of the most interesting of immunity tests. The original antigen aimed at for the complement deviation test in syphilis was naturally the causative organism. At that time the *Spironema pallidum* had not been cultivated—or this test might never have been elicited—and an extract of liver from congenital syphilis containing large numbers of spirochaetes was employed. An *alcoholic* extract was used, and it was found that this antigen (in suitable form) along with the serum of syphilitic cases produced marked complement absorption. The specificity of the reaction for syphilis was established, but it was discovered later that extracts from normal liver, the liver and certain other organs of animals, acted also as satisfactory antigens. In short, the antigenic substance was not the *Spironema pallidum* or its products, but the lipoids of normal tissue.

It might be said, therefore, that the Wassermann reaction is not a true immunity test. It is none the less clinically specific for syphilis with certain limited exceptions. Investigation has tended to show that this reaction is a quantitative rather than a qualitative change in the serum. As a result of syphilis, some substance normally present in the serum—probably of antibody nature—is increased in amount, which, along with lipoids, absorbs or deviates complement.

While the Wassermann reaction involves an elaborate technique with certain pitfalls and fallacies, the serological diagnosis of syphilis is tending towards simplification by the application of the so-called Sachs-Georgi or "flocculation" reaction. This test bears almost the same technical relationship to the Wassermann reaction as an agglutination test to other complement deviation reactions. It depends on the fact that the serum in syphilis produces flocculation or precipitation of a suspension of the same lipoid antigen used in the Wassermann reaction. The technique is simple as compared with that of complement deviation. Only two reagents (antigen and serum) are required and the phenomenon is easily observed.

The so-called Weil-Felix reaction presents a further anomaly in immunity. This test has proved of undoubted value in the diagnosis of typhus fever, and its discovery was quite fortuitous. Like the Widal reaction, it is an agglutination test, and depends on the development during this illness of specific antibodies (agglutinins) for a type of *Bacillus proteus* ("X 19") which has no etiological relationship to the disease. Nevertheless, the occurrence of this reaction is highly specific for typhus fever.

The significance of such anomalous immunity reactions calls for some consideration. They exemplify what we now designate "heterogenetic" or "heterophil" antibodies—that is, antibodies specific for an antigen which has no biological relationship to that acting as the immunizing stimulus. This subject has been mainly one of theoretical interest, but, as you see, it has relationships to general medicine. It was found some years ago that a rabbit injected with the tissues (for instance, kidney) of a guinea-pig developed a haemolytic antibody specific for sheep's and goat's red corpuscles (Forssman's antibody). The natural occurrence of specific antibodies in the serum of man and animals had long been recognized, and also that antibodies might have no obvious etiological significance. As a matter of fact, Forssman's heterophil antibody represents an increased output of a natural antibody in the same way as the Wassermann reaction is the result of an exaltation of a natural substance.

We have still no definite knowledge as to why such antibodies should occur. The inherent capacity to produce them may have originated far back in the ancestral biological history of the species. Why they should be increased by certain heterologous stimuli is also beyond present explanation.

Without going further into the diagnostic applications of antibody reactions, it should be said that in many infections, even where a serological test would be of the utmost value, specific antibodies cannot be demonstrated, or are present in such small amount as to render an antibody test impracticable. In tubercle and in gonorrhoea complement deviation tests with the patient's serum and cultures of the corresponding organism have been extensively applied, but their practical value is limited. Generally speaking, serological tests have had a restricted application in medicine, but where they have proved practicable the results have been of outstanding service in adding to diagnostic efficiency.

Apart from clinical diagnosis, immunity reactions have been extensively utilized in bacteriology for the identification of species. The system is the same as in the diagnostic tests, but in this case the antibody is the known quantity, the antigen the unknown. In short, certain species—for example *B. typhosus*—can only be accurately identified by testing the organism with a serum containing a specific antibody to this species, obtained by animal immunization. The agglutinin is the antibody almost entirely used in this work.

This application depends on the specificity of antibodies. While in certain cases antibodies are specific for the biological species, specificity may be more restricted and limited to what we call serological types within the species. The serological distinction of types (for example, among

pneumococci, meningococci) has exerted an important influence on artificial immunization. In the case of the pneumococcus three well defined types can be recognized, and, by immunizing animals with the separate types, an antiserum has been obtained to Type I which, given intravenously in large doses, is capable of reducing the mortality of cases of pneumonia due to this type.

I should like to state a general rule that applies to immunization and then instance exceptions of practical interest. Antibody immunity can only be produced by the introduction into the tissues of an alien or foreign antigen. Thus an animal cannot produce antibodies to the red cells of its own species or *a fortiori* its own cells.

In the condition known as paroxysmal haemoglobinuria, the result usually of syphilis, for some unexplained reason a specific substance of antibody nature is developed to the individual's own red corpuscles. This body is haemolytic (autolysin), and under certain conditions is capable of producing intravascular haemolysis and haemoglobinuria. Blackwater fever, a recognized complication of malaria, has also been regarded by some as due to a similar autolysin, but the evidence is inconclusive.

Red corpuscles are susceptible to agglutination by serum antibodies in the same way as bacteria. A haemagglutinin may be produced by immunizing in the usual manner with the red corpuscles from another species, but one of the most remarkable serological observations has been that the serum of certain individuals, for example, in the human species, may agglutinate the red cells of others, and that according to this mutual reaction of serum and cells, human individuals can be grouped into four well defined classes. This subject became prominent during the great war, when blood transfusion was a routine procedure, and when the injurious effects due to intravascular haemagglutination had to be avoided by ascertaining the effect of the recipient's serum on the donor's red cells. Here we have an instance of a serum substance, possibly of the nature of a natural antibody, acting on an antigen from the same species, and thus the agglutinin is spoken of as an isohaemagglutinin. It is of further interest that such group characters are hereditary and follow Mendel's law, and out of this has come a method by which, in certain cases, disputed paternity might be decided.

There are other interesting applications of antibody reactions to which I might refer, but the instances I have given are sufficient to show the ramifications of the subject and the practical results of its study.

NON-SPECIFIC IMMUNIZATION.

Perhaps one of our most difficult problems in applied immunity at the present time is that of "non-specific immunization," by which is meant the production of increased resistance by other than specific measures. The accumulated clinical evidence that an infection may be favourably influenced in this way cannot be ignored. For example, there is some reason to believe that the intravenous injection of certain proteins (for instance, proteose preparations, bacterial vaccines) is efficacious in cases of arthritis, including rheumatoid arthritis, and it might be argued that frequently the beneficial effects of vaccines are non-specific in nature.

The commonest method of non-specific therapy has been the intravenous injection of foreign toxic proteins, and the empiric aim is the production of what is called "protein shock." By this is meant a reaction to the foreign substance manifested clinically by rigor, fever (or, if pyrexia already exists, a further elevation of the temperature), aggravation of any local lesion, and various other symptoms associated with the fever. Along with these external effects there may be an increase in the nitrogen excretion indicating an effect on tissue metabolism, a "leucocyte stimulation" and increase of leucocytes in the circulating blood, an increase of proteolytic ferments in the serum, and possibly an increased output of antibodies. In short, the result might be regarded as a temporary exaggeration of the general reactive process which is the essential element in acquired resistance.

Apart from the parenteral injection of toxic proteins, other measures have been employed with a view to producing non-specific effects—for example, the artificial abscess following the subcutaneous injection of turpentine, and even the artificial interposition of another infection. The fact that an intercurrent infection might influence an existing infection has long been recognized. It has even been suggested that counter-irritants, from the seton and cautery to the poultice and blister, owe their accredited effect to such non-specific action, and that irradiation by sunlight and other rays, the injection of colloidal metals, and certain drugs (iodides, for instance), act in the same way.

This form of therapy has now been extensively exploited, and the clinical data do not always supply the most convincing proofs. On the experimental side proof of non-specific immunization might be based on immunity reactions, or protection experiments in animals. An apparently non-specific reaction demonstrable by antibody effects has been exemplified in persons vaccinated with typhoid vaccine and subsequently developing another infection at a time when the "post-vaccine" agglutinins have almost disappeared from the blood. The second infection leads to a renewed production of the typhoid agglutinin. Thus heterologous stimuli may increase the output of antibodies once the tissues have been sensitized by the specific stimulus. The reappearance of latent antibodies has also been demonstrated in animals as the result of injection of a heterologous bacterium or even non-bacterial proteins—that is, the types of substances used for non-specific therapy. The heterophil antibodies already referred to also exemplify non-specific immunization.

By protection experiments on animals it has been shown that increased resistance may be produced non-specifically. Thus Harvey and Iyengar found that in pigeons a relative immunity to *B. avisepticus* resulted from the injection of *B. coli* vaccine, though quantitatively inferior to that produced by a specific vaccine. In experiments of my own, evidence has been elicited that the resistance of guinea-pigs to experimental infection by *B. diphtheriae* could be increased by the injection of normal serum from various animals and even from other individuals of the same species, though also inferior to the protection conferred by a specific antitoxin.

Non-specific therapy, therefore, is not without some support on the laboratory side, and the further exploration of this field in the treatment of infective disease seems justified.

HOW INTERFERENCE IN LABOUR MAY BE LESSENED BY EXAMINATION DURING PREGNANCY.*

BY

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MY purpose is to draw attention to the application of the methods of modern medicine to the particular problems of midwifery practice. These methods may be stated shortly as, first, the effort to maintain normal functioning by removing any known cause of its disturbance, and, secondly, detecting the earliest sign of disordered function with a view to immediate treatment and cure. If this is our attitude of mind towards the digestive, cardiac, and other functions it must equally be so in regard to the whole reproductive function, including that of parturition.

An anticipatory vision in the management of labour is the most striking development of this attitude of mind applied to the practice of obstetrics. Its relation to the old practice may be aptly compared to the difference between an army commander relying on his tactical skill in emergency to repel surprise attacks, and one who, with all modern means of discovering his enemies' intentions, breaks up threatening concentrations before the attacks mature. Indeed, the prematernity supervision may be termed the intelligence branch in the war against mortality and disability in childbed.

Ante-natal supervision is as yet in its infancy, and much

* Address delivered to a meeting of the Swansea Division of the British Medical Association.

still remains to be done to improve its methods of investigation. Some enthusiasts have run the new thing to death, and their methods have tended to make the pregnant mother consider her condition as pathological rather than physiological. This danger must be kept in mind and the purpose of the supervision and examination explained to the woman. So far as possible, investigation of suspected abnormalities should be made as little obvious as can be. The chief aims of the supervision may be stated as:

1. Maintaining health of body and mind in the pregnant woman.
2. Preserving the pregnancy to full time.
3. Foreseeing and avoiding preventable difficulties in labour.
4. Preparing the mother for the nursing and care of her child and generally educating her in regard to her own health and that of her family.

If these aims are successfully carried out their effect on maternal and infantile mortality and disability is too obvious to require mention. Reproduction, though physiological, puts a severe strain on the efficiency of every system of the body, and, like passing recruits for active service and "vetting" the crews in a boat race, the thorough investigation of the state of health of the woman early in her pregnancy and further observation to see how she is standing the test, seem but reasonable precautions. Quite apart from those who have some organic weakness and who may break down under the strain, there are special illnesses, such as the toxaemias of pregnancy, that may arise, even in those in the best physical condition. Putting on one side the loss of prospective life, miscarriage is a prolific cause of operative interference during or after its occurrence, often as an emergency and in unfavourable surroundings, and of subsequent disability. Stillbirths and early infantile mortality for the most part result from toxic states of the mother (for example, syphilis and albuminuria), prematurity, and birth injuries. The good health of the mother throughout child-bearing means not only that her resistance to infection and disease is increased, but also her efficiency in looking after her family when they are most in need of her care.

Though the health of the mother will be the primary consideration throughout pregnancy, it will be noticed that there is a difference between the objective in the early and in the later months—say, after the viability of the foetus. In the first three months or so the preservation of the pregnancy is the chief matter; in the last two months the purpose of the investigation will chiefly be towards foreseeing and preventing difficulty and complications in labour.

The ante-natal supervision should be directed to the maintenance of the general health at its best and to the removal of all possible septic foci and the discomforts and troubles connected with the pregnancy; but it is impossible to go into so large a problem, and I will select two types for detailed consideration, as illustrative of the methods employed: first, the woman with albuminuria, and, secondly, the cases of possible difficulty in labour from malpresentation and misfit.

Albuminuria.

In regard to the first, I do not wish it to be thought of solely in terms of eclamptic convulsions and possible complications in labour, for there is a far commoner possible result, and that is permanent renal damage. As the testing of the urine is the first sieve to strain out cases for further investigation, the next point is to determine the meaning of the albuminuria, and for that it is necessary that a catheter specimen should be obtained, so as to make sure that the albuminuria is not due to contamination after the urine has left the bladder; and then a further chemical and bacteriological examination may be necessary to exclude those cases due to pyelitis or cystitis—that is, those in which the albuminuria has arisen after excretion from the kidneys. The next point to determine is how far the renal function is affected, for albuminuria by itself is not proof positive of its disturbance. Diminished secretion, the presence of casts, oedema, and raised blood pressure would indicate renal damage, and to determine its degree the urea concentration test should be carried out. As soon as any impairment of renal function is discovered the essential matter is to keep the patient strictly to bed, and observe what rest with a restricted protein intake will do. In most cases the effect of the diminished metabolism is the rapid recovery of the renal function and the disappearance of the albuminuria. In the more severe cases, however, improvement may be slow or may not occur. If, after a couple of weeks, no improvement results, and still more if the continuance of headache and sickness, increased oedema, and persistent high blood pressure show that the condition is both serious and resistant to treatment, the pregnancy must be terminated, for fear of progressive and permanent renal damage, or, more rarely, eclamptic convulsions. Improvement, even if slow, will justify further observation. One of the most obvious clinical signs for the termination of the pregnancy is a rising or persistently high blood pressure, as it is a warning of the onset of eclampsia. Dimness of vision with oedema of the retina and exudate is another indication for the immediate termination of the pregnancy, because of the risk of permanent damage to the eyesight. The same principle holds good in other disorders of pregnancy, and that is to determine how far conditions will yield to treatment, and, only in those cases in which other measures have failed, to resort to the induction of abortion or premature labour.

Malpresentation and Disproportion.

I intend to confine my remarks this evening chiefly to the examination necessary to discover the position and presentation of the foetus, the pelvic capacity, and, so far as possible, to detect any factors likely to complicate the labour. This part of the examination is not begun till the last two months of pregnancy—that is, about the thirty-fourth week—as before then it is rarely possible to discover with accuracy the presentation, and, even if it were, a completely different state of affairs may be present a few weeks later. Before the thirty-fourth week induction of labour is rarely worth while, as the chances of survival of the child are too slender.

The general physical development of the woman should be noted, both in the erect position and when lying down. A height under 5 feet, narrowness across the hips, spinal curvature or other deformity, lameness due to disease of the hip-joint or to infantile palsy, should always suggest the need for special care. Bone or joint disease or other condition that has necessitated a long period of lying on the back during childhood may have checked the full development of the pelvic girdle. The appearance of the abdomen should be carefully observed, both when standing up and recumbent, and the size, shape, and position of the uterus noted. The pendulous abdomen of the multiparous woman is easily recognized and is especially marked when standing up; it is liable to be accompanied by late engagement of the head and malpresentation, and requires support during the later months of pregnancy. The history of the previous labours may indicate whether there has been difficulty before, but even if there has been none it must not be forgotten that the deviation of the uterine axis may cause malpresentation at the beginning of labour, thus calling for careful observation as soon as labour has started, and that other factors may be present that were not previously. In a first pregnancy, on the other hand, unusual forward projection of the uterus, especially if persistent even in the dorsal position, indicates deficient space in the abdominal or pelvic cavity. The common causes are overdistension of the uterus, small abdominal capacity, as in short stumpy women or those with spinal deformity (for example, kyphosis), bringing the ribs close down to the iliac crest, or pelvic contraction preventing the descent of the head into the pelvis so that the foetus is entirely abdominal. Decided forward projection of the uterus in a first pregnancy should always attract attention, but the cause is usually readily determined, and all cases in which it is due to non-descent of the presenting part should raise the suspicion of some misfit between the head and pelvis.

The diagnosis of presentation and position is carried out by the ordinary obstetrical examination, and should be confirmed again later. Rectification of a breech presentation is most easily effected about three weeks before term, and though rectification of the foetal lie and the uterine obliquity by padding and a binder may be tried in shoulder presentations, the more favourable time, owing to the tendency to recurrence, is as a rule at the commencement of labour. In any case in which external version has been

done further examination is necessary to see that there has not been a reversion to the original presentation. Face and brow presentations are rarely recognized at the ante-natal examination, and, if recognized, are not readily converted to, or maintained as, a vertex. For the most part they arise at the onset of labour, and, as in oblique lies, reliance must chiefly be placed on discovering the high position of the head and the conditions liable to give rise to them, and trust to rectification at the onset of labour. Occipito-posterior positions are likewise best treated either just before or immediately at the onset of labour by a pad and binder, after the method of Buist.

The other important part of the obstetrical examination is that of the pelvic capacity, which is carried out by two different methods—one pelvimetry, and the other the estimation of the fit of the head into the brim. The two methods are complementary, and although formerly the measurements were thought to be all-important, wider experience has led to their being looked upon rather as a rough guide and so relegated to a secondary place, the fit of the head in the brim being taken as the deciding factor in determining treatment.

The abdominal examination is especially important as the simplest method of picking out those cases requiring further investigation. The head high up and floating above the brim is easily accessible to palpation. If it has descended into the pelvic cavity the fingers must be sunk into the pelvis in order to recognize the hard and immovable mass filling up the sacral hollow. A high position of the head in a primigravida during the later weeks of pregnancy must always be taken as a warning of possible trouble. The head is commonly found in the cavity during the last month or six weeks of pregnancy, and a high position in the last two weeks must always call for full investigation. In multiparae, especially those with a lax abdominal wall, there is neither the same tension within the abdomen to drive the head downwards nor does the uterine axis lie directly in that of the inlet to facilitate descent, and hence a high position of the head has not the same significance. The history of previous labours in these cases, however, will generally serve to decide whether there is a diminished pelvic capacity, but the possibility of undue size of the head must be borne in mind.

A rough test can be made of the relation between the size of the head and pelvis by pressing the head downwards from the abdomen. If the two poles of the head, the forehead and hind-head, can be felt very distinctly a transverse position of the head with some degree of extension is probable, indicating some flattening of the brim. If in addition the biparietal prominence is easily recognizable, and still more if on pressing down the head it bulges over the pubes, there is definite evidence of misfit. Willett emphasizes the important evidence that can be obtained by laying the flat of one hand on the suprapubic region while the head is pressed down between the fingers and thumb of the other hand, when the parietal eminence, if felt, must be taken as a warning during pregnancy and a danger signal in labour. He also holds that if the palm of the hand is placed on the parietal eminence, it may be found that when the patient sits up and leans forward the parietal eminence sinks below the pubes, showing that the head will pass the brim. By pressing the head into the brim with the patient in the dorsal position an impression can thus be obtained of the amount of room and of the ease with which the head will enter, and those cases in which difficulty is suspected should then be reserved for further examination by the bimanual method. The treatment of the minor degrees of misfit between the head and the pelvis is by the induction of labour before the child is large enough to cause difficulty, and yet not too small to give trouble in rearing.

The cases of high position of the head with difficulty in making it enter the pelvis, picked out by the rough abdominal examination, are now examined bimanually—that is, with two fingers of one hand in the vagina, whilst the other hand on the abdomen presses the head down into the pelvic cavity. This method is more accurate because the internal fingers can be placed fairly accurately in the centre of the pelvis and the pressure of the head directed on to them—that is, nearly in the proper axis—thus obviating a difficulty in the abdominal method, where pressure is liable to be made either too much backwards on to the sacral promontory or too much forwards on to the pubes. The fingers in the vagina also estimate the degree of descent of the head, how far it can be made to slide down behind the symphysis, and how tightly it fills the inlet and cavity, or whether it merely sits on the brim and bulges over the pubes. As soon as the bimanual examination shows a tight fit, the examination is repeated under anaesthesia and the final decision made as to whether to proceed at once to induction or postpone it for a week or two.

If the patient is examined at the thirty-fourth week, and it is then discovered that disparity between the head and the pelvis is such that even at this early stage natural delivery is unlikely owing to a serious degree of pelvic deformity, Caesarean section at term would be selected. These cases are, however, very rare, and in the lesser degrees of deformity the woman would be seen every fortnight. The fit of the head would be judged by rough estimation until difficulty in pressing down the head was detected, when the bimanual examination under anaesthesia would be made in order to decide the most suitable time to induce. Except in the extreme degrees of pelvic deformity, in which delivery of a living child by the natural passages is clearly impossible, the tendency will be to prefer induction in a young woman so as to have accurate knowledge of what is possible by the natural powers. Nothing is learnt from Caesarean section, and the scars in the uterus and abdominal wall are a source of weakness and a cause of anxiety in all future pregnancies and labours. For a time the more dramatic Caesarean section was overdone, largely because a short-sighted view, limited to the one pregnancy, was taken instead of a wide vision over the future reproductive life of the woman. In a young woman with the whole of her reproductive life in front of her an early induction should be preferred, even if it offers but a slender chance of the child being reared. A natural labour carefully observed and conducted will teach us much more than we can learn from the most thorough examination, and in a young woman with twenty years of reproductive life in front of her it is much better for her future to make a trial trip of her first pregnancy and know by experience what the natural powers can do. Usually they will do better than we expect. On the other hand, in a woman who has had previous labours in which induction has failed to give a living child, or in a woman in her first pregnancy towards the end of her reproductive life, Caesarean section would clearly be the preferable method of delivery, as securing her a living child in what might be her only pregnancy.

Other Causes of Interference.

These examples will suffice to indicate how complications in childbed from malpresentation and misfits may be eliminated by anticipation, investigation, and treatment during pregnancy. There remain, however, the haemorrhages and convulsions, to which passing reference must be made, as both are considerable items in making up the mortality in child-bearing. We know so little as to the causation of ante-partum haemorrhage that our endeavour must be to take the first occurrence of bleeding as a warning of possible further trouble to come. Except that accidental haemorrhage occurs more frequently in women suffering from albuminuria and the intoxications of pregnancy, we know nothing of the causes of separation or abnormal implantation of the placenta. As the causes are unknown, the second best must be done by considering the occurrence of any bleeding of moment as a warning of the possibility of more serious trouble ahead, and therefore keeping the patient at rest and under observation and being prepared to take immediate action if the need arises. If placenta praevia can be definitely diagnosed, it is unsafe to temporize. Eclamptic convulsions rarely occur without albuminuria or other warning signs, and thus their unexpected onset is greatly limited by proper ante-natal supervision; they may, however, occur occasionally in patients under observation and treatment for albuminuria, when they are not usually serious, or may develop suddenly with little warning.

I have tried to show how far the complications due to malpresentations and misfits, to ante-partum haemorrhage and convulsions, with consequent interference in labour, may be greatly lessened. Errors due to miscalculations will be with us so long as we remain erring mortals, but as we become more experienced they will become fewer. There will, however, be left over four-fifths of the interference in labour—the low forceps delivery, the "shoehorn" operation of easing the head over the perineum because of failure of the forces of labour to overcome the final obstacle of the resistance of the levator ani muscles. Happily this procedure is a minor one, but even it calls for a fresh attitude of mind in regard to it, though that is another story which I cannot begin to-night. The forceps must be regarded as our second line of defence after our first line has given way, and we must try to strengthen the first line, which is to seek out the causes of the ineffectiveness of the powers and remove them—of which fatigue, long-continued pain, anxiety, and dread of the ordeal are the most prominent.

Lectures
ON
THE SYMPATHETIC INNERVATION OF STRIATED MUSCLE.*

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LECTURE II.—PART II.

THE FUNCTIONS OF THE TWO GROUPS OF MUSCLE FIBRES:

EXPERIMENTAL EVIDENCE (Continued).

EXPERIMENTS ON BIRDS.

THE folded attitude of the wings of birds when standing or walking affords an excellent example of what Sherrington has called an "active posture"—namely, the maintenance of position against the action of gravity by means of the activity of contractile tissues. I thought a study of the mechanism concerned in the production and maintenance of this posture would throw light on the postural activity of voluntary muscle generally, and provide a means of determining the exact part played by the dual nerve supply—somatic and sympathetic—of such muscle in the production and maintenance of posture.

The effect of gravity, which would be freely acting under normal conditions in some birds, would tend to cause drooping and falling outwards of one wing, if the mechanism for the maintenance of its posture were interfered with, and by comparison with the position of the normal wing of the opposite side the degree of interference is readily measurable. The wing offers advantages for study over the limbs of the cat, dog, and goat, in which the normal attitude is extension, for compensatory efforts are necessary in order to retain this position in the interests of maintaining the erect attitude. This tends to mask the effects of injury reducing the efficiency of the postural mechanism. Variations in the position of the wing may also be studied more easily than alterations in the degrees of flexion of the hind limbs of the frog after sympathetic ramisection, as suspension of the frog (which is necessary to allow the normal side and the injured side to be compared) introduces rotatory reflexes. This circumstance renders a careful analysis necessary in order to dissociate the effects of labyrinthine impulses from the proprioceptive effects produced in the musculature of the limb itself[15] (cf. Langelaan, *Brain*, 1915 and 1922).

In his memoir, "The Postural Activity of Muscle and Nerve,"[16] Sherrington says:

> "Section of the afferent roots of the wing affects little, if at all, the folded posture maintained by the wing when not in flight, i.e., during standing or walking. Nor has the source of the postural contraction of the flexors of the wing been found. Here, as in the case of the iris, the postural contraction, if, as is presumable, reflex, lies in receptors not those of the contracting muscle themselves—is, in short, allogenous not autogenous."

In view of our experiments on goats it appeared to me that a possible explanation for the failure to alter materially the folded position of the wing, by severing the posterior nerve roots corresponding to the origin of the brachial plexus, was due to the fact that in such an experiment the sympathetic innervation of the voluntary muscle of the wing was left intact. In previous papers (see, for example, *Surgery, Gynecology and Obstetrics*, December, 1924) I have argued that the function of the sympathetic nerve supply of skeletal muscle is the maintenance of posture once the position is attained—in other words, that it is responsible for the property of plastic tone. It appeared desirable, therefore, to ascertain the effect of removal of the influence of the sympathetic nerve supply of the muscle of the wing by section of the cervical sympathetic. The result of the first experiment of this kind has already been recorded.[17] The wing was markedly drooped compared with the normal side when the body of the fowl was supported in the hand during recovery from the anaesthetic. Later the droop of this wing was definitely noticeable but not so marked, its tip being 1.5 cm. lower than the tip of the intact wing. The wing also was less firmly folded to the side of the body. This condition was still noticeable when the fowl was kept at rest for some minutes up to the time of being killed seventy-four days later. A *post-mortem* examination revealed that the vertebral sympathetic cord had been cut below (or behind) the upper two roots of the brachial plexus only, so that the effect was incomplete. Subsequent operations of a more complete character, in which the sympathetic was approached by dissection of the intertransverse spaces from behind, instead of from the front as in the first experiment, gave similar results.

Anatomical Features of the Cervical Sympathetic Trunk of Birds.

The vertebral sympathetic plexus or cord, which contains the fibres that interest us in these experiments, passes through the foramina of the transverse processes along the vertebral vessels on a plane ventral to the roots of the brachial plexus. On approaching the ribs the cord usually splits into dorsal and ventral trunks, which pass respectively dorsal and ventral to the neck of the rib. The operation usually performed on the fowls was to divide these trunks above the first true rib (at *C* in Fig. 7)—that is, caudal to the last large nerve (the last cervical) which contributes towards the formation of the brachial plexus. In sea-gulls I invariably cut the dorsal and ventral trunks immediately behind (or below) the penultimate cervical nerve as well. This section produced a more marked effect on the eyelids than the more caudal section. Langley has shown that the last cervical nerve is the first nerve through which pre-ganglionic fibres of the sympathetic nervous system emerge from the spinal cord. He records that the criterion of movement of the feathers following stimulation shows that these fibres are distributed to the upper part of the neck and the head. It may be distributed to the anterior part of the wing, but the effect is only slight when it occurs there. Therefore the more caudal section of the sympathetic

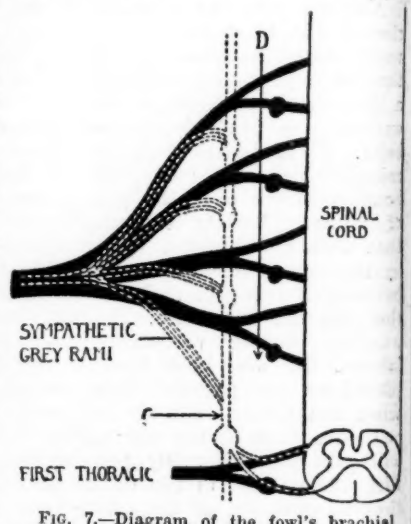

FIG. 7.—Diagram of the fowl's brachial plexus. *C*, The spot where the whole sympathetic connexions of the wing can be severed. *D*, The line along which either the posterior or the anterior somatic roots or both can be cut.

* Delivered by Professor Elliot Smith at University College, January 26th, 1925.

chain satisfies the purpose of the present investigation. But the changes in the position of the eyelid are useful as indications that the chain has been successfully identified and cut. In the fowl the effect of section of the cervical sympathetic above the last cervical nerve (at *C* in Fig. 7) produces a raising of the lower eyelid and a more marked drooping and overhanging of the upper lid, so that the pupil is partially obscured. Normally the upper lid is retracted to such an extent that only its free edge is visible. After the operation, especially when viewed from above, it may be seen for an extent of several millimetres. When the effect is not so apparent as in the lower section alone a useful test is to draw the upper lid down over the eye on each side and compare the rate of its return on the two sides. It returns perceptibly more slowly on the operated side, and the return is, of course, not complete. The effects on the eyelid of the sea-gull are not so noticeable as in the fowl because they are smaller and less mobile. But the circular palpebral tissue becomes oval in shape following the operation.

The removal of the cervical sympathetic cord has an effect upon the pupil in the bird, as Langley has shown. The test of ruffling the feathers described by Langley is useful to determine whether the operation has been successful. On the normal side the feathers rapidly return to their normal depressed condition, whereas on the side from which the sympathetic innervation has been removed the return is slow.

In this series of experiments the effect upon the blood vessels was not used as a criterion to indicate whether the sympathetic had been severed or not. In one case a marked increase of temperature of the comb occurred on the side of the operation. In another marked pallor was observed in the vascular appendages of the head following the operation. This was probably due to a state of strong contraction of the capillaries following sympathetic denervation described by Krogh. On examination on the following day in the above instance it was again present.

The Effect of Section of the Cervical Sympathetic upon the Posture of the Wing.

The immediate effects upon the position of the wing of section of the cervical sympathetic cord have already been briefly noted. In the fowl the wing is somewhat drooped on the affected side. This persists after healing has completely occurred. For instance, in one of the fowls the distance of the tip of the wing from the mid-line, as measured by the callipers on the eleventh day following the operation on the left side, was 4.2 cm. on this side, compared with the corresponding measurement of 3 cm. on the normal side. When the wings were stretched outwards and then simultaneously released, an average of three measurements on the left and right sides were 4.2 cm. and 2.2 cm. respectively. These differences are in part due to the falling away of the limb from the side (abduction) in addition to dropping downwards. An estimate of the difference due to these causes is also obtainable by measuring the distance of the outer surface of the wing at the level of the elbow-joint from the mid-line on each side. On the day in question the left and right measurements were 10.1 cm. and 8 cm. respectively.

Another change due to the operation is the slowness in the return of the partially denervated limb to its final position when released after stretching outward or downward or after elevation. This effect is perceptible to the eye and is constant over numerous trials. Cinematographic records confirmed this observation. The greater part of the return movement takes place relatively rapidly, though not so rapidly as on the normal side. The limb remains somewhat abducted and elevated, and then slowly settles down to its final position, which is closer to the trunk and in a somewhat more depressed position. This latter element in the return movement may occupy several seconds. If the wing is passively placed in its normal position it rapidly falls to the depressed level. Sometimes the bird itself voluntarily lifts the wing to its normal position, but it quickly falls to its original position. This effect becomes more marked in fatigue—for example, after repeated examination.

In sea-gulls abduction and dropping of the elbow is apparent, but the effect is not so marked as in the fowl, because the tail is normally used to support the large wings, which in some of the specimens operated upon attain a span of a metre from tip to tip. In the normal position of the wings they lie crossed over one another resting on the tail. Subsequent to cervical sympathetic section the affected wing takes a position nearly parallel with the direction of the tail, and, following a two-sided operation, an interval may exist between the two wings which is not normally to be seen. When an affected wing is removed from the support of the tail it droops below the tail level approximately to the extent of 2.5 cm. The drooping of the wing is very marked during the process of recovery of the limb from the anaesthetic. Open ether was the anaesthetic employed in each experiment.

For purposes of control the vertebro-scapular muscles were severed on both sides, and both right and left sympathetic cords were exposed, but only the left was cut. The only difference between the two sides, therefore, is that section of the sympathetic cord was performed on the left side and not on the right side.

It is apparent from these remarks that the tone of the affected wing is reduced so that the normal posture is not perfectly maintained. But considerable tone remains, and it tends to impose a folded posture upon the wing. This influence must be due to the presence of the somatic proprioceptive reflex arcs which remain intact, but in the absence of the influence of the sympathetic innervation of the wing the maximum position of abduction and flexion can no longer be maintained against the action of gravity. This force leads to some degree of drooping and abduction of the wing. During light anaesthesia the effect is rendered more evident as the result of the partial removal of the influence of the somatic proprioceptive connexions. The influence of the somatic arc is also markedly reduced by fatigue, as already noticed following repeated stretching of the wing in the fowl. The natural effort of sustaining flight shows the result of fatigue to greater advantage. These observations were carried out with the bird attached to a light line mounted on a smoothly running reel. In the unilateral operation the position of the normal wing may be used as a control, as in sea-gull 3. Before flight only slight abduction and droop of the elbow region of the wing were apparent. After a flight of one hundred metres, in which the wings were maintained in constant movement so that no gliding occurred, the abduction and drooping became very marked. The wing no longer rested on the tail, and the bird made ineffectual attempts to place it in its usual position. On supporting the body of the bird in the hand and allowing the wings to drop freely a condition resembling that seen in similar circumstances during recovery from the anaesthetic resulted. Fatigue of the somatically innervated muscles has apparently produced this effect, so that the condition of the wing in such circumstances is not far removed from that seen in flaccid paralysis.

These observations are in accord with the results of our operations on goats—namely, that the sympathetic innervation of voluntary muscles is responsible for the maintenance of plastic tone. The defect following removal of the sympathetic influence consists in inability of the voluntary muscle to remain fixed at a given length—such, for instance, as the length required to maintain the extended position of the limbs in a quadruped when placed on its back, the flexed position of the frog's hind limbs, or the folded position of the wing normally assumed when a bird is walking or standing. The flexed posture of the wing, to take the latter instance, is conferred upon the wing by the intact somatic proprioceptive reflex arc; and this tendency disappears when this arc is interrupted. Therefore this arc, when intact, subserves contractile tone (Langelaan, 1922). The position of flexion of the wing imposed by the contractile fibres fails to be maintained to the full degree in the absence of plastic tone, which is subserved by the sympathetically innervated fibres of the striated muscle of the wing. Normally, therefore, plastic tone is the property of muscle enabling the flexed position to be maintained. The "catch" or "ratchet" mechanism of involuntary muscle described by Uexküll is beautifully illustrated. The fixed

position of flexion of the wing can no longer be maintained for an indefinite period with a minimum of fatigue in the absence of the sympathetic arc. Furthermore, after voluntary activity of such partially denervated muscle, of which flight provides the best example, exhaustion of the somatic reflex mechanism manifests itself to a striking degree. It is evident, therefore, that the sympathetic innervation plays a part in movement as well as at rest. To retain the analogy already mentioned, it would appear that an "infinitely fine ratchet" assists in voluntary movement. This helps to maintain the intermediate postures through which the muscle passes during the execution of an active movement.

In the absence of the sympathetic nerve supply it is apparent that greater work is imposed upon the somatic nervous system during voluntary activity, for it not only performs the voluntary movement, but alone supports the weight of the limb. When both wings have been partially denervated by removal of the sympathetic nerve supply (as in sea-gull 8) after several short flights both wings were drooped and the bird was apparently exhausted, the mouth was widely open, and respiration very rapid. On being approached the bird only attempted short low flights to avoid recapture.

The effect of the section of the cervical sympathetic trunk in narrowing the palpebral fissure is to be ascribed to loss of plastic tone of the striated muscle of the eyelid to a greater degree than to the denervation of involuntary muscle. Dr. Oliver Latham of Sydney has made gold chloride preparations which show the sympathetic non-medullated fibres terminating in characteristic grape-like endings on considerable bundles of the eyelids. Removal of the influence of these fibres affects the capability of the muscle to remain fixed at the length required to maintain the eyelids widely separated.

Section of the Afferent Limb of the Sympathetic Proprioceptive Reflex Arc.

By cutting the posterior nerve roots (see the line *D* in Fig. 7) Sherrington conclusively proved that tone is subserved by a proprioceptive reflex mechanism. The question arises, then, as to whether a sympathetic proprioceptive reflex arc is responsible for the production and maintenance of plastic tone. Langley showed that the feathers of the wing are influenced by stimulation of the last cervical nerve and the upper two thoracic nerves. Of these the first thoracic nerve has a strong effect on the wing. The anterior part of the wing may be affected by the last cervical nerve, but this effect when present is only slight. The second thoracic nerve has a moderate or slight effect, usually on the posterior part of the wing only. Acting on the supposition that the sympathetic innervation of the voluntary muscle of the wing would have the same origin as that of the feathers, an operation was performed on the first thoracic posterior nerve root. This may be done by enlarging the first foramen seen on the dorsal view of the fused thoracic vertebrae. *Post-mortem* examination showed that this root was completely severed without injury to the anterior nerve root. In this case the brachial plexus received no somatic contributions from the first thoracic nerve. The large size of this root in all the specimens operated on is a striking feature in view of the slight part, if any, this segment takes in the formation of the brachial plexus. This confirms the suggestion that this nerve contributes the principal sympathetic connexions to the wing, so accounting for its large size. The effect of removal of the posterior root of this nerve upon the posture of the wing is in all respects the same as that following section of the cervical sympathetic cord caudal to the brachial plexus. Drooping and abduction of the wing are apparent; and, on releasing the wings after stretching, the affected side was perceptibly slower in returning to its final position. On the fifth day the measurements were as follows: The tip of the wing was 2.5 cm. from the mid-line on the left side, and 0 cm. on the right side; or, measured by the callipers, the elbows were 80 cm. and 6.8 cm. from the mid-line respectively. When the wings were stretched outward and then released the tips were 2.7 cm. and 2 cm. from the mid-line on the left and right sides respectively. It is evident, therefore, that if a sympathetic proprioceptive arc subserves plastic tone afferent fibres must descend along the ganglionated (vertebral) chain to the first thoracic level and there pass to the nerve trunk at this level by way of one or other or both rami communicantes. In the experiment of section of the cervical sympathetic posterior to the brachial plexus both afferent and efferent fibres are therefore severed. The same effect follows section of the afferent limb of the arc only when the first thoracic posterior nerve root is cut through. Sherrington's preparations, in which the afferent nerves were cut, owe some of their features to removal of the influence of the sympathetic proprioceptive reflex arc subserving plastic tone, for in "deafferenting" the fore limb of the cat he removed *inter alia* the posterior nerve root of the first thoracic nerve, and in the case of the hind limb of that animal the fourth lumbar posterior nerve root was one of the two roots resected. In the cat the thoracico-lumbar outflow extends from the first thoracic to the fourth lumbar segment: hence Sherrington's operations included the region of the sympathetic innervation of the limbs.

Persistence of Plastic Tonus after Removal of all the Posterior Nerve Roots Connected with the Brachial Plexus.

The anatomical connexions of the somatic and sympathetic nervous systems and the wing musculature make it possible to remove the influence of the former without materially affecting the innervation derived from the latter source: for the most important sympathetic connexion consists of a reflex arc at the first thoracic level. On one side the posterior nerve roots of four segments above this level were removed with a view to removing the influence of the somatic reflex arcs. In addition to the absence of voluntary movement the result of this operation is to remove the tendency of the wing to take up a flexed position—that is, contractile tone is absent. When the wing is stretched outwards, therefore, and released, it drops to the side of the bird, and instead of taking up the flexed attitude characteristic of the normal wing it remains dependent. If the wing is passively flexed it will remain in this new position. In this way the wing may be moulded into the position normally occupied by it, and it will remain there indefinitely.

The wing may now be drawn down to a dependent position, where it will remain. It has, therefore, the properties of a plastic body, enabling it to retain any position in which it may be placed. In other words, the flexors of the wing exhibit the "shortening and lengthening reactions." These reactions indicate the presence of plastic tone.

It may be inferred, therefore, that contractile tone, which normally tends to impose the typical posture upon the wing, is absent in such a preparation, and is therefore a function of the somatic proprioceptive reflex arc that has been destroyed. Plastic tone, which fixes the length of the muscle fibres to maintain a posture once assumed, is a function of the sympathetic proprioceptive reflex arc that remains intact. Together these components of tone are responsible for posture, so that the combination of the two may be called "postural tone."

In one fowl in which the posterior roots of the brachial plexus had been severed, the relationship between plastic tone and the sympathetic innervation of the wing musculature was shown by a further experiment. The cervical sympathetic was severed immediately below (or behind) the last cervical nerve, directly after an examination that revealed the presence of plastic tone in the wing. After the operation the plastic tone had disappeared. The wing was heavy and dependent as in flaccid paralysis. It would not remain in any position of flexion in which it was placed. When folded over the back of the bird it dropped heavily to the ground. This experiment proves conclusively that the plastic tone exhibited after the first operation was maintained by the sympathetic proprioceptive reflex connexions of the wing musculature. As other experiments have shown, this is at the level of the first thoracic segment in the fowl.

Compensatory Increase in Contractile Tone after Sympathetic Denervation of the Skeletal Muscle of the Wing.

To test the duration of the effect upon the wing of severing the cervical sympathetic trunk caudal to the brachial plexus, the position of the normal and affected wings of some preparations were daily measured. I am indebted to Mr. R. E. Murray, who carried out these daily observations. Fig. 8 is a graphic record of these observations. One observation was made each day on the position of the elbow. An average of three readings of the position of the tips of the wings from the median line was recorded daily. Both graphs show the same features. The contractile tone increases in the affected wing until both wings are approximately equidistant from the median line. This condition is gradually attained and the distances become equal in about sixty days. A similar result is found after removal of the afferent limb of the sympathetic proprioceptive reflex arc.

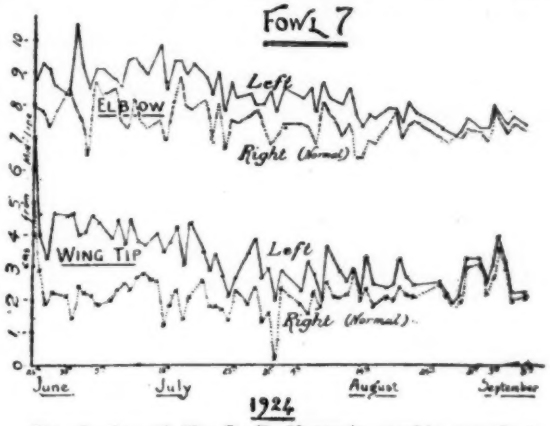

FIG. 8.—One of Mr. R. E. Murray's graphic records to express the compensatory increase in contractile tone in a fowl's wing after sympathetic denervation.

When this compensation has taken place the effect of cutting the cervical sympathetic is manifested under two conditions; when the bird is kept at rest for a period of approximately fifteen minutes or longer, the droop and abduction of the operated side reappear. Fatigue has a similar effect. Starting with the elbows and tips of the two wings equidistant from the median line, the left wing and then the right wing were each folded across the back by passive movement fifty times. The difference in the distance of the elbows from the mid-line was then 2.2 cm. and the difference in the distance of the tips from this line was 2.9 cm., due to the droop of the wing on the operated side.

Plastic tone was therefore still absent. It remains to account for the increase in contractile tone. Magnus and de Kleijn have demonstrated that pathways other than the afferent nerves from the muscles themselves affect the tone of skeletal muscle. These accessory influences are the labyrinths and the proprioceptors of the neck muscles. In the resting conditions both these sources of impulses would no longer be effective, and consequently the contractile tone would be lessened, as in the experiment recorded above. It is noteworthy that Langelaan has shown that in frogs removal of plastic tone from the hind limb leads to domination of the labyrinth of the opposite side. This leads to extension of the normal limb and increased flexion of the limb upon the operated side.

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15 Compare Langelaan, *Brain*, 1915 and 1922. 16 Ibid., 1915. 17 *Med. Journ. of Australia*, June 14th, 1924, p. 581.

THE HYPOTONIC (FLABBY) CHILD.

BY

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A CONSIDERABLE proportion of the children seen at the out-patient department of a children's hospital present such indefinite symptoms but such a uniform clinical picture that they were thought to be worth investigating in detail. These children are generally between the ages of 2 and 7 years, and are brought to hospital for such complaints as tiredness, lack of energy, pains in the limbs on continued exercise, knock-knee, flat-feet, or turning in of the toes when walking, and hence may be seen by either the general physician or the orthopaedic surgeon. Sometimes, however, the complaint was merely that the child had no appetite or was pale, and the usual diagnosis was "debility."

On examination of these children the most striking feature is their stance and their extreme lack of muscle tone. This is well shown in the figures. The large "pot" belly with compensating lordosis is the result of the extremely feeble development of the abdominal muscles. Hyperextensible joints, knock-knee, flat-feet, turned-in toes, and winged scapulae are further expressions of this same lack of tone. The great majority of cases appear well nourished, but the limb muscles are so soft that it is sometimes difficult to judge whether they are really properly developed. It is interesting to note here that the calf and thigh muscles are always better developed and have better tone than the arm muscles. Many have enlarged tonsils and adenoids, and some have a more generalized lymphoid enlargement.

Cameron[1] recently described a type of case frequently seen at the out-patient departments, which he terms the nervous child. This is not, however, the type of patient which the writer is attempting to describe and elucidate. The child which Cameron describes is as a rule an only child or the youngest child of elderly parents. He is thin, dislikes to hold himself in the upright position, and has what is described in America as the "fatigue" stance. His day is spent in bursts of activity and periods of collapse. During a period of exhaustion his stance is like those under investigation, but his muscles never at any time show the hypotonia of a flabby child. The metabolism of the "nervous exhaustion" child is as a rule overactive, and what is required for him is mental and physical rest.

With the hope of elucidating the etiology of this clinical syndrome of flabbiness an investigation of a large number of cases was undertaken during the past year at the Hospital for Sick Children, Great Ormond Street. Early in the investigation it was clear that a number of factors were involved, and the following is a review of these factors and of the various theories that have been put forward to account for the condition.

DIET.

Recently Mellanby[2] has stated that by diet alone in dogs he can produce every degree of muscular weakness and wasting and can cure the same by restriction of cereals and

addition of cod-liver oil. He also claims that the muscular flabbiness of rickets can be cured by the same line of treatment. He believes that the cereals have a neutralizing action on the antirachitic factor, so that on high cereal diets the dose of cod-liver oil must be increased. Vining[3] also believes in a dietetic error, probably carbohydrate excess, as one of the causes of the "debilitated state," although he considers the toxic factor to be more important.

An investigation was made of the diets of the children attending the out-patient department, and it was found that as a general rule they were all on the same badly balanced diet, which was too liberal in calories for the output of energy in the day. This diet was ridiculously high in carbohydrate, which was mainly cereal, and low in animal proteins and fats. Although all the children of the poor were on this badly balanced diet they did not all show flabbiness, and some had remarkably good tone. This difference was seen to occur even in the same family. Further, many of these flabby children were treated for months on therapeutic doses of cod-liver oil with no improvement, but at the same time it must be noted that the cereals were not restricted, as such a measure was impracticable when dealing with the out-patient class of patients. It is obvious from the above that other factors besides diet must be concerned in the production of muscular hypotonia.

It is interesting in this connexion to note the reports of Holt and Fales[4] on children in an institution in New York. These children received a most liberal diet, but one which included a large excess of carbohydrate (over 60 per cent.), and yet they were in most excellent physical condition. Practically the same portion of food was allowed to both the younger and older children, but both increased normally in weight and remained in good health.

Confinement and Lack of Exercise.

That rickets, and especially lack of muscle tone, is due to confinement has been the opinion of the Glasgow school for many years. Recently Galbraith[5] stated that although cod-liver oil caused a deposition of calcium in the bones and healed bony manifestations of rickets, nevertheless the muscular flabbiness remained as marked as ever. He reports rapid cures of flabbiness with massage and exercise.

That actual immobility does not necessarily produce lack of muscle tone is suggested by a study of the results of the open-air treatment of children suffering from tuberculous hips or spines, gross rickets, or congenital malformations. These children during their treatment are confined in splints for long periods, but they are lightly clad and exposed to both moving fresh air and sunshine, and under these conditions retain excellent muscle tone. This can be explained by the work of Leonard Hill[8] as due to the stimulating effects of sunshine and moving fresh air on metabolism. It is a matter of common observation that normal children with good tone who are confined to bed as a result of some acute illness rapidly become flabby, but after being up soon evince a desire to move about and quickly recover their muscle tone. This is in marked contrast with the true flabby child, who shows no desire for exercise. Undue confinement sometimes occurs even in the homes of the well-to-do, and though the children are taken out of doors they may not get sufficient walking exercise, as they are sometimes kept too much in their perambulators. At the same time these children are receiving an over-liberal diet and are excessively warmly clad.

Inquiries into the histories of the hospital cases showed that many of these flabby children had practically no exercise during the day, only being taken out for about one hour in the morning. The majority were confined to small quarters which were badly lit and badly ventilated. When the children reach the age of 4 or 5 years they are allowed out by themselves and also commence school; at this age the number of hypotonic children rapidly decreases. The superior tone of the calf muscles as compared to the arm muscles also becomes very remarkable at this age, although the same contrast to a lesser degree is seen in younger children. This is obviously due to the fact that the calf muscles are those most exercised. Another interesting point noted was the frequent complaint that the children were always tired and slept much during the day.

From the above facts it would appear that lack of exercise and confinement, though very important factors in the production of hypotonia, will not by themselves produce flabbiness but must be correlated with others in order to have this effect.

Toxic Theory.

Vining[3] has suggested that toxic absorption from either the throat or bowel plays a most important part in the production of the debilitated state. Wills and Warwick[6] showed that children with septic tonsils as a rule had excellent muscle tone, but that true hypertrophy of the adenoid tissue of the throat was associated with flabbiness of the muscles. There is no evidence that toxic absorption is taking place from the bowel. The constipation which is present in a number of the cases is rather the result of the atonicity of the abdominal and bowel wall muscles than the cause of this condition. Against the toxic theory is the fact that in tuberculosis, syphilis, and rheumatism, all of which are chronic toxaemias, flabbiness may occur but is certainly not characteristic.

Constitutional Defect.

The theory is put forward by Czerny[7] that there is a type of child who is born with a particular constitution which he calls the "exudative diathesis." In this type the muscles are flabby, the child is inactive, shows general enlargement of the lymph glands, and is prone to infections of the mucous membranes. Whether such a child exists or not it is difficult to say. Certainly every clinician knows that there are infants who from birth are firm, quick in their movements, inclined to be under weight, and difficult to fatten, while other infants are slow in their movements, flabby, sleep a great deal, gain weight easily, and do this on a low calorie intake. In the former the metabolic fires are burning rapidly, while in the latter these fires are burning slowly.

Conclusions.

1. A consideration of the first two theories—namely, diet and lack of exercise—suggests that factors which tend to depress metabolism produce flabbiness, while factors which tend to stimulate metabolism cure flabbiness.

2. The factors which tend to depress metabolism and produce flabbiness are confinement, and lack of exercise, fresh air, and sunshine; overclothing with consequent heat retention, overfeeding or over-calorying in relation to the child's output of energy in the day; feeding with a diet too high in cereals, too low in animal fat and protein, and defective in vitamins.

3. The factors which tend to stimulate metabolism, and therefore cure flabbiness, are the reduction of the diet and especially of the cereals, retaining in the diet a sufficient amount of animal fat and protein; the administration of cod-liver oil; and stimulation by sunshine, fresh air, exercise, massage, and open-air treatment, with scanty clothing to increase heat loss from the skin.

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BLOOD CALCIUM AND INORGANIC PHOSPHATES IN CHILDREN WITH MARKED LACK OF MUSCLE TONE.

BY

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It is well recognized that extreme lack of muscle tone is a characteristic accompaniment of bony rickets, and many consider this symptom as definitely part of the rachitic syndrome. This flabbiness is, however, characteristic of a type of child frequently seen in any out-patient department

and generally classified as debilitated, though when the child is under 3 the diagnosis of rickets is sometimes made on this flabbiness alone, even if there are no signs of either past or present bony rickets. This association of poor muscle tone and rickets suggests the possibility that the so-called debilitated flabby child may be suffering from mild rickets. It was with a view to testing this hypothesis that the present investigation was undertaken, which is only part of a general study of the "flabby child." Further, in a previous study,[1] when working in the Ear, Nose and Throat Department of the Royal Free Hospital, it was shown that children with true hyperplasia of the lymphoid tissue of the nasopharynx, as distinct from those with enlarged lymphoid tissue resulting from previous infection, had poor muscle tone. In fact, it was this study of the adenoid child that led to the present wider investigation.

NATURE OF INVESTIGATION.

Investigations of the blood in cases of rickets have shown characteristic changes: the serum-calcium value is more variable than in normal cases, and the average figure slightly lower, and the inorganic phosphates are in nearly all cases markedly lowered. A study of these two components was therefore undertaken in two control groups—one of normal children and one of sick children—and in a group of flabby children, to ascertain if there was any constant characteristic departure from the normal in the latter group.

The first control group (Group 1) consisted of twelve normal healthy children of the hospital class, aged 2 to 11 years. The second control group (Group 2) consisted of thirty-one children, aged 2 to 12 years, with enlarged and inflamed tonsils and adenoids, each of whom had, however, excellent muscle tone. This group was included not only to compare two groups of sick children, but also in the hope of obtaining further evidence in support of the classification of cases of adenoids into those with septic enlargement and those with true hyperplasia. The third group was made up of children, aged 1 to 12 years, with poor muscle tone. These cases were selected by Dr. Donald Paterson at Great Ormond Street Hospital, and had the following characteristics: soft flabby muscles, resulting in such abnormalities as large pendulous bellies, hollow backs, hyperextensible joints, and flat-feet; most had large tonsils. The children were brought to hospital for vague disorders, lassitude, or weakness. Children with any definite organic lesion were excluded from the series. No case with any suggestion of bony rickets was included.

METHODS.

Kramer and Tisdall's[2] method was used for the estimation of calcium in serum, and Briggs's[3] modification of the Bell-Doisy method for the inorganic phosphates in plasma. The plasma used for the phosphate solutions was always separated from the corpuscles within half an hour of drawing the blood; specimens showing any haemolysis were discarded. Owing to the difficulty of obtaining sufficient blood from small children both determinations could not always be done on the same patient.

RESULTS OF CALCIUM DETERMINATIONS.

Blood-calcium values for children have been determined by many authorities, and the majority are agreed that in normal children the serum-calcium value lies between 9.5 and 11.5 mg. calcium per 100 c.cm. of serum, with higher values in young infants. Jones and Nye[4] and Denis and Talbot,[5] using Lyman's method, report a much larger range, which has not been confirmed by other workers. Anderson,[6] working with whole blood, reports a wide range of normal values, but, as the question of corpuscular calcium is still in dispute, it is difficult to assess the value of her findings. In children suffering from rickets there is no very marked decrease in the serum-calcium values, such as is found in tetany and some cases of nephritis, but the range is much greater. Expressed in milligrams of calcium per 100 c.cm. of serum or plasma, the following ranges and averages are reported: Kramer, Tisdall, and Howland,[7] 8 to 11.1, average 8.6; von Meysenbug and co-workers,[8] 7.9 to 9.8, average 8.6; György,[9] 7.2 to 10.7, average 8.5. Mayer,[10] however, reports high serum-calcium values in early cases of florid rickets.

In the present investigation the blood-calcium values for the group of children with hypotonic muscles and for the control groups are set out in Table I. The values for the normal children (Group 1) are, without exception, above 10 mg. per 100 c.cm. of serum, and range from 10.1 to 11.0 mg. The values for the other control cases (Group 2) have a lower average—9.8 mg. of calcium per 100 c.cm. of serum, with a range of from 8.7 to 19.6 mg.; only one value, however, was below 9 mg. The general health of the individuals of Group 2 varied; some were in good health at the time, although their tonsils and adenoids were enlarged as the result of previous infection; others, on the other hand, were in very poor condition, with acutely inflamed tonsils, aural and nasal discharges, etc., but all had excellent muscle tone. The cases with poor muscle tone (Group 3) gave serum-calcium values averaging 9.0, with a range of from 6.6 to 10.6 mg. per 100 c.cm.; of the 30 cases only 5 showed a value of 10 mg. or more.

TABLE I.—*Blood-calcium Values.*

	Type of Case.	Age.	No. of Cases.	Milligrams Calcium per 100 c.cm. Serum.		
				Lowest.	Highest.	Average.
Group 1	Normal	2-11	10	10.1	11.0	10.4
Group 2	Inflamed tonsils and adenoids but good muscle tone	3-12	20	8.7	10.6	9.8
Group 3	Poor muscle tone	2-9	30	6.6	10.6	9.0

Note.—If Groups 2 and 3 are combined as a control group the range becomes 8.7 to 11.0, with an average of 10.1.

It has been suggested that there may be a seasonal tide for calcium as well as for the inorganic phosphates of the blood (Hess[11]). The present study was made during the months of April, May, and June; no seasonal change was indicated during that period in any group, but the figures and time are both too limited for any deductions to be drawn.

RESULTS OF INORGANIC PHOSPHATE DETERMINATIONS.

The inorganic phosphate values in normal children, as established by various authorities, average for whole blood 4.0 mg., and for serum and plasma 4.1 mg. per 100 c.cm. With the exception of Jones and Nye[4] and of McKellips, De Young, and Bloor,[12] the latter working on infants, who give a range of from 1.9 to 5.4 and 1.2 to 4.6 mg. per 100 c.cm. respectively, authorities seem agreed that the normal range is from 3.2 to 6.5 mg. per 100 c.cm., but that the values are nearly always over 4.0 mg.

In contrast with the normal is the characteristic low value found in most cases of active rickets, uncomplicated by tetany. Howland and Kramer,[13] for example, give a range of from 0.6 to 3.2 and an average of 2.0 mg. per 100 c.cm. of serum; Anderson[6] gives from 2.5 to 5.3, with an average of 3.3 mg. per 100 c.cm.; György[9] gives from 1.6 to 2.9, with an average of 2.4 mg. per 100 c.cm.

In Table II are given the values for the inorganic phosphate in the three groups under consideration in the present investigation. There is no difference between the values in Groups 2 and 3; the figures in both groups cover the same range, and with five exceptions fall within the normal limit. The five normal cases comprising Group 1 give a slightly higher average, but a larger number might have shown a wider range. The findings are not such as would be expected if the condition in Group 3 (flabby children) is regarded as akin to florid rickets.

TABLE II.—*Values for Inorganic Phosphate.*

	Type of Case.	Age.	No. of Cases.	Milligrams per 100 c.cm. Plasma.		
				Lowest.	Highest.	Average.
Group 1	Normal	5-10	5	4.1	6.1	4.8
Group 2	Inflamed tonsils and adenoids but good muscle tone	3-12	20	2.9	5.1	4.1
Group 3	Poor muscle tone	1-11	25	2.5	6.1	4.5

Kramer, Tisdall, and Howland[7] state that in normal blood the product of the calcium and inorganic phosphate values should be 40 or over, while in rickets it is reduced below this value. György[9] uses the quotient of the organic phosphate into the calcium values, and states that in normal cases this figure should be 1.95, in rickets 3.5, and in tetany 1.4. Five cases in Group 3 of the present investigation show a lowered product, but a lowered quotient also, due to the lowering of the calcium value, while the phosphate value remained normal. The quotient (with one exception, where it is 1.32), though lowered, is never as low as in cases of tetany, and the significance of this change is not evident.

CONCLUSIONS.

The serum-calcium values found in the group of normal children agree with those of other workers. The values obtained in Groups 2 and 3 show a wider range than the normal, the difference being more striking in Group 3 (hypotonic children) than in Group 2. In Group 3, moreover, the average calcium value is 9 mg., a slightly lower figure than the average of 10.4 found in the normal cases. Five cases in Group 3 have values of 10 mg. or more, and many other of the cases have but a slightly lowered value; and further, inversely, a few cases in Group 2 have lowered values though good tone. It is therefore clear from these two facts that muscle hypotonus is not immediately dependent on the serum-calcium level, as it can occur with either high or low values. A wide range of calcium values is probably constantly associated with this poor tone, even as a similar range has been shown to be associated with rickets, but it does not operate as a causative agent. The fact that Group 2 had a greater range than the normal suggests that such variation occurs in other conditions of ill health.

The inorganic phosphate figures for the three groups, with a few exceptions which occur both in Groups 2 and 3, fall within the limits of the normal and do not differ from each other. In contrast with these findings are those recorded in cases of bony rickets where low inorganic phosphate values are constantly found and are considered by most authorities as typical of the disease. Anderson,[6] however, as a result of her work on rickets, suggests the need for further investigation of blood phosphates in disease "causing and probably preceded by considerable muscular inactivity and atonicity," before deciding whether a low blood phosphorus is an exciting cause or merely a result of rickets. The normal values found in Group 3 (flabby children) are of interest in this connexion, as they do not suggest any association between lack of muscle tone *per se* and a low inorganic phosphate level in the blood, such as is frequently found in rickets.

The balance between the calcium and the inorganic phosphates, expressed either as the product or the quotient of the phosphate and calcium figures, does not appear to be appreciably altered from the normal in Groups 2 and 3, though there is a slightly greater range in the figures in Group 3, owing to the greater variability of the calcium figures. In fact the chemical findings reported above do not appear to support the hypothesis that muscle hypotonus in children is necessarily an indication of some degree of rickets, though the hypothesis can only be adequately tested by a study of the conditions in which these flabby children live and by the result of carefully controlled treatment.

SUMMARY.

1. The average serum-calcium value in 10 normal children (Group 1) was found to be 10.4 mg. and the range 10.1 to 11.0 mg. per 100 c.cm.; and in 20 cases with inflamed tonsils and adenoids but good muscle tone (Group 2) it was 9.8 mg., and the range 8.7 to 10.6 mg.

2. The average value found in 30 cases with marked lack of muscle tone (Group 3) was 9.0 mg., and the range 6.6 to 10.6 mg. per 100 c.cm.

3. The average value of the inorganic phosphates of the plasma was found to be approximately normal in all three groups (50 cases), and there was no difference in the range of values in Groups 2 and 3.

4. Though the calcium values were more variable in Group 3, no relationship between the calcium level in the blood and muscle hypotonus was established.

5. The blood picture of flabby children is not similar to that of rachitic children, though the calcium variation is the same in both conditions.

In conclusion I would express my thanks to Dr. Donald Paterson for selecting the cases of flabby children, to Mr. Gay French for permission to investigate his cases, and to Dr. Harrison for permission to work in the Biochemical Department, Great Ormond Street, and for his valuable help with this work.

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MIKULICZ'S DISEASE ASSOCIATED WITH ARRESTED MILIARY TUBERCULOSIS.

BY

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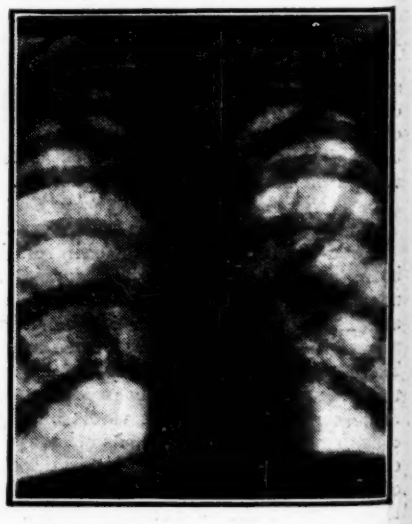
THE following case seems to be of sufficient interest to merit publication.

E. D., a girl aged 15 years, was admitted to the City of London Hospital, having been diagnosed at her local tuberculosis dispensary as a case of early phthisis. Her history was that three months before coming under our observation she had gradually begun to feel weak and easily tired, developed a slight dry cough, and once brought up a few streaks of blood. At the same time she noticed a marked "puffiness" of the eyelids for which she was treated for subacute nephritis, a trace of albumin having been found in her urine at this time. In regard to her past history, she had been a healthy child except for measles, chicken-pox, and whooping-cough at 3 and 4; at 2, however, she had had a severe illness, the details of which are vague; apparently her chief symptoms were fever and acute pains all over, for which she was kept in bed for about three or four weeks. There was no family history of tuberculosis, and she had two brothers and a sister alive and well. The patient was rather pale, but otherwise did not look particularly ill. She had very little cough, she had no night-sweats, and her temperature was normal.

Repeated careful physical examinations showed a chest apparently little removed from the normal. A radiogram, however, showed the remarkable appearance seen in the accompanying figure, and was suggestive of an acute miliary tuberculosis. A diffuse miliary mottling is observed throughout both lung fields. The possibility that this appearance might have been due to an anthracosis was excluded by the fact that the patient had never been engaged in any dusty occupation. So inconsistent, apparently, was the radiogram with the physical signs and the condition of the patient, that a second film was taken; this showed precisely the same state of affairs. A sputum examination showed tubercle bacilli present; subsequently, however, there have been seven successive negative examinations.



The second point of interest about this case was that there were found to be symmetrical enlargements of the

parotid, submaxillary, and lacrymal glands. The enlargement of these latter had apparently been much greater a few weeks prior to coming under our observation, and had no doubt given rise to the erroneous conclusion that the patient was suffering from kidney trouble. The swellings were smooth, uniform, and not fixed. It was thought that the accessory lacrymal glands were palpable, but not the socia parotidis. The glands of Blandin-Nuhn were distinctly felt as two round hard swellings at the tip of the tongue, as described by Ziegler.[1] The sublingual glands did not seem to be abnormal and the swellings sometimes said to be found on the hard palate were not observed. The liver and spleen were not enlarged; there were lymphatic glands palpable in the neck near the submaxillary glands, but otherwise the lymphatics did not appear to be affected. The tonsils had been removed some years previously. A blood count showed 5,600,000 red cells, haemoglobin 90 per cent., leucocytes 10,000. A differential count showed 62.5 per cent. polymorphonuclear leucocytes, 6.5 per cent. hyalines, and 31 per cent. lymphocytes. The urine was normal.

Since the syndrome of simple lymphomatous hyperplasia of lacrymal and salivary glands was first described by Mikulicz, many cases resembling but not synonymous with this condition have been recorded from time to time in the literature. Von Brunn has attempted to classify the various diseases associated with these symptoms as follows:

1. *Cases without alteration in the blood*—
   (*a*) Without symmetrical swellings of the spleen or lymphatic glands.
   (*b*) With swellings of the spleen or lymphatic glands.
2. *Cases with alteration in the blood*—
   (*a*) Severe aplastic anaemia with lymphatic pseudo-leukaemia.
   (*b*) Leukaemia.

Only cases coming under Group 1 (*a*) appear to be true cases of Mikulicz's disease. Campbell Howard collected 55 cases of this type down to 1909, but since then few, if any, cases have been recorded in the literature. The most recent contribution on the subject which we can find appears to be that of Thursfield in 1914,[2] and his case appears to have been one of "lymphatic pseudo-leukaemia." Our case certainly comes under Group 1, and, except for two doubtful glands in the neck, the lymphatic apparatus does not appear to have been involved.

The association of our case with a tuberculous condition of the chest is interesting, for whilst the majority of cases appear to be a simple chronic interstitial inflammation, non-tuberculous (Igersheimer and Pollot),[3] both tuberculous (Krailsheimer, Pitt, and Napp)[3] and syphilitic cases (Lange, Luders, Gutmen, and Jackobaus)[3] have been recorded from time to time.

PROGNOSIS AND TREATMENT.

According to Thursfield,[2] prognosis is bad in the leukaemic and pseudo-leukaemic, but appears to be good in true cases of Mikulicz's disease. Arsenic and potassium iodide are usually recommended in treatment. The results of operative intervention appear to have met with different results in the hands of different observers. Ziegler records how removal of one of the enlarged glands has resulted in great increase in the size of the rest. Elliot, on the other hand (*Ophthalmoscope*, 1911),[3] has recorded a case in a Hindu woman in which operation on the lacrymal glands was successful and was followed by diminution in the size of the parotids and submaxillaries. In view of the uncertain results of the cases recorded we have not thought operation justifiable in our case, especially as the swellings are giving rise to no unpleasant symptoms; we are simply giving arsenic and potassium iodide. *X* rays have met with success in some cases.

In regard to the remarkable chest condition revealed by the skiagram such cases have been recorded before. H. K. Dunham and J. H. Skavlem[4] say:

> "Many cases of healed miliary tuberculosis are being found by our more general use of the *x*-ray chest studies. This diagnosis is only justified when the subject gives no history of work in a dusty trade. Lungs of anthracite miners most nearly simulate miliary tuberculosis. The *x*-ray picture is that of fine, sharp, discrete studdings, more or less evenly distributed throughout all lobes. . . . Most peculiarly these patients seldom, if ever, give any history suggesting serious lung infection."

The undiagnosed illness with which the patient was affected at the age of 2 is not without interest, however, although its significance is difficult to estimate. Opie[5] has noted in several necropsies extensive calcified tubercles of the lung and lymph nodes, so that "a grave infection must have existed at some time previous—even though there had been no history of corresponding symptoms, there was doubtless at some period imminent danger of death from tuberculosis."

Prognosis is necessarily uncertain from lack of experience of similar cases. Dunham[4] considers that such patients are likely to go downhill rapidly if they become subsequently infected.

We are indebted to Dr. Clive Riviere for permission to publish this case; to Dr. Sparks, who took the *x*-ray film; and to Dr. D. S. Page, who did the blood count.

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Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

HERPES ZOSTER AND VARICELLA.

As the relationship of herpes zoster and chicken-pox is still undecided, I desire to place the following case on record.

On December 19th, 1924, a woman developed herpes zoster. On January 3rd, 1925, her son, aged 5 years, was covered with a typical rash of chicken-pox. The following facts seem to point to some relationship between the two diseases:

1. The boy had not been away from his own home for several weeks.
2. There is not a case of chicken-pox in his neighbourhood, so far as I can ascertain.
3. The child slept in a cot in his mother's room.
4. The fourteen days' interval between the onset of the two diseases agrees with the incubation period of chicken-pox.

On the other hand, if there is any relation between herpes zoster and chicken-pox, it is strange that the coincidence of the two diseases should be so infrequent. This is the first occasion that I have seen them occur in the same family at the same time.

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RUPTURE OF ABDOMINAL WALL WITH PROTRUSION OF UNINJURED INTESTINE.

THE interest of the following case appears to me to lie in the fact that a crushing injury of the abdomen could produce a rupture of the abdominal wall and protrusion of the intestines without injury to the intestines or other viscera, as is usually found.

A boy, aged 16, was admitted to hospital on October 3rd, 1924. He had been crushed between the buffers of two railway wagons, and it was found on examination that about three feet of small intestine protuded through an opening below the tenth rib in the mid-axillary line.

The patient was anaesthetized and several small lacerated wounds were found in the skin, through one of which the intestine was protruding. On incising the skin there was a gap, four inches in length horizontally and two inches wide, in the muscular layers and peritoneum of the abdominal wall, with great laceration of the tissues. The intestine appeared to have escaped injury, and was replaced within the abdomen. The eleventh and twelfth ribs were fractured and the distal portions of these were removed. After excising all damaged tissues the layers of the abdominal wall were brought together with difficulty and closed. A laparotomy through a left paramedian incision was then performed to exclude injury to abdominal viscera, but nothing abnormal was discovered except some retroperitoneal haemorrhage, not extensive.

The boy made an uninterrupted recovery and his abdominal wall is now perfectly sound with no bulging at the site of the injury.

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MYELOID LEUKAEMIA ENDING AS LYMPHATIC LEUKAEMIA.

THE case reported below is interesting because of the remarkable reduction of the myeloid leucocytes from 892,000 to 11,600, with corresponding recovery of health, so that the man was able to return to work. It was very disappointing that acute lymphatic leukaemia should have supervened, as it is not primarily a disease of the bone marrow like the myeloid condition. This case is not a solitary coincidence, since, a few years ago, another patient with myeloid leukaemia, whom I had successfully treated with *x* rays, also died of lymphatic leukaemia.

A man, aged 38, was admitted to hospital under me in February, 1923, with an enormous spleen extending into the left iliac fossa. His blood count was: red cells 2,820,000, leucocytes 892,000 (polymorphs 44 per cent., lymphocytes 16 per cent., eosinophils 4 per cent., mast cells 4 per cent., myelocytes 32 per cent.). There were several small retinal haemorrhages, and, soon after admission, he developed a large haematoma beneath the left scapula. This became so painful that 12 oz. of altered blood were aspirated from it; it filled up again, however, but with less pain. It was slowly absorbed, lasting in all about three months. The treatment employed was exposure to *x* rays twice weekly of the heads of the long bones at the knees, hips, and shoulders, and of the spleen, the dosage being arranged by Dr. W. B. Prowse. The leucocytes steadily diminished in number, rather more rapidly when arsenic was given as well as the *x*-ray treatment. The man's condition also improved and his spleen became much smaller.

In February, 1924, his blood count was: red cells 4,030,000, leucocytes 56,100 (polymorphs 73 per cent., lymphocytes 2 per cent., eosinophils 2 per cent., mast cells 7 per cent., myelocytes 16 per cent.), and he was able to do light work. In July he was strong and well, and the spleen was only an inch below the costal margin. The blood count then was: red cells 4,856,000, leucocytes 11,600 (polymorphs 76 per cent., lymphocytes 5 per cent., mast cells 11 per cent., myelocytes 1 per cent.), and the *x*-ray treatment was suspended. At the beginning of September he became rapidly short of breath and very anaemic. His blood count was then found to be: red cells 2,760,000, leucocytes 160,000 (lymphocytes 94 per cent., polymorphs 4 per cent., and myelocytes 2 per cent.). He died of this acute lymphatic leukaemia in three weeks.

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GASTRIC CANCER TREATED BY PYLORECTOMY AND GASTRO-ENTEROSTOMY.

THE case here recorded is of interest on account of the following peculiar characteristics: (1) the very unusual amount of peristalsis definitely ending in the tumour; (2) the extensive mobility of the growth; and (3) the absence of glands, adhesions, or ulceration, yet almost total occlusion of pylorus.

A. T., a lady aged 72, consulted us in December, 1924, complaining of obstinate vomiting; food was rejected immediately after being taken. No history of haematemesis was given. She had constant epigastric pain, and had lost a considerable amount of weight. The symptoms were of three months' duration. Examination of the abdomen revealed marked peristalsis, the waves showing a rise of one inch above the surrounding abdominal wall. A definite tumour, the size of a hen's egg, was palpable under the right rectus. It was firm and freely movable in all directions. Splashing was distinctly audible on palpating the stomach, and the peristaltic waves could be felt to end at the tumour. There was no free fluid in the abdomen, no glands were palpable, and there was no enlargement of the liver.

Operation.—A right rectus incision was made, and the muscle retracted outwards. The tumour was found to be the pylorus; it could be easily lifted out of the abdomen. There was no evidence of adhesions or glandular involvement. The liver was normal. The stomach was much enlarged and thickened. Posterior gastro-enterostomy was first performed, as it was doubtful how the patient would stand resection, but when it was found that her condition was favourable we proceeded to remove the pylorus, one inch of the first part of the duodenum, and as much of the pyloric end of the stomach as possible.

Recovery was uneventful, and when she left the nursing home nineteen days later she was able to eat full diet with no discomfort.

Examination of the specimen showed that the mucous membrane was intact over the tumour area; there were no signs of previous ulceration. The pyloric canal was almost completely occluded. The carcinoma presented colloid degeneration.

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Surgeon, Grimsby and District Hospital.

Reports of Societies.

POST-OPERATIVE PULMONARY AFFECTIONS.

A COMBINED meeting of the Sections of Surgery, Anaesthetics, Medicine, Obstetrics and Gynaecology, and Pathology of the Royal Society of Medicine was held on February 4th to discuss "The prevention and treatment of post-operative pulmonary affections." Mr. H. J. PATERSON was in the chair.

Mr. E. C. LINDSAY said that there was a growing belief that post-operative lung complications, such as pneumonia, pleurisy, and collapse, which had been a source of contention and mutual reproach between surgeon and anaesthetist, were not the result of irritation or congestion, but were in fact the result of pulmonary embolism and infarction. Wharton and Pierson considered that 40 per cent. of pleurisies and 12 per cent. of pneumonias after gynaecological operations were due to pulmonary embolism. Such embolism might be of (1) the massive type, occluding one or both pulmonary arteries; (2) the infarction type, followed by pleurisy and signs of consolidation; (3) the type where the site of the embolus prevented its recognition as such; this type was associated with slight respiratory increase, mild evening pyrexia, and the expectoration of small quantities of blood and mucus. Two cases were quoted in which this third type of embolism had served as a warning—in one case of the massive embolism that occurred later, and in the second case of thrombosis of the veins of the leg. It was noteworthy that in many cases a premonitory sign of the massive type of embolism was an urgent desire to defaecate, and the speaker suggested that this might be due to a vaso-motor reflex set up by the passage of the clot from the femoral or iliac veins. Sir Charles Gordon-Watson and Wharton and Pierson had emphasized the importance of the slight evening rise of temperature as a constant premonitory sign. A research into the records of surgical cases at the London Hospital for the years 1914-24 revealed 114 undoubted cases of pulmonary embolism. It had been stated that this unfortunate condition was increasing, and changes in blood character and coagulability depending on changes of diet had been suggested as a cause. But in Mr. Lindsay's opinion the increase was more apparent than real, since the percentage in the London Hospital cases agreed very closely with Rupp's figures as the result of the investigation of over 22,000 operations from 1903 to 1920. Rupp also found that the mortality of pulmonary embolism in internal disease without operation was 1.1 per cent.—four times as high as that following operation. An analysis of the London Hospital cases showed that age was a very important factor, the average for the series being 52 years. The average of urinary bladder and prostate operations complicated by pulmonary embolism worked out at 60 years, and even in appendicitis the average age was 30.4 years, although there were included among them cases whose ages were 2½, 11, and 13 years. As regards the different types of operations which were responsible for embolism, 21 cases occurred in 2,778 gastric operations, 22 cases in 2,004 major gynaecological operations, 17 cases in approximately 4,000 appendix operations, and 12 cases in 1,967 hernia operations. As in other published series, gynaecological operations therefore headed the list in order of frequency. *Post-mortem* examination revealed thrombosis in 42 per cent. of the cases, the thrombosis being in the left common iliac or left iliac vein in half of these cases. Thrombosis of the pelvic, iliac, and femoral veins was found in 47 per cent. of the gynaecological cases, and 57 per cent. of the gastric cases. This was remarkable, since in one case the operation involved the systemic venous system and in the other the portal system. In none of the *post-mortem* notes was there any mention of extensive thrombosis at the site of operation. The question of primary pulmonary thrombosis had been discussed by Professor Glynn and others, but the speaker found it difficult to reconcile the size of the thrombus, its considerable length, its frequently unbranched appearance, and the fact of its being nearly always rolled up, with the formation of the clot in the

pulmonary artery. Further, the pulmonary artery, though carrying venous blood, was arterial in type.

Dr. F. E. SHIPWAY said that the two outstanding post-operative pulmonary complications—bronchitis and pneumonia—occurred more frequently after abdominal, and especially upper abdominal, operations than after operations elsewhere, and were very rare in private practice. Bronchitis, although not often directly fatal, was a very serious complication in the unfit. It sometimes arose in a mild degree in a perfectly healthy patient after ether anaesthesia, and was caused partly by exposure, but chiefly by the cooling and irritating effects of high concentrations of ether vapour, which lowered the resistance of the lung tissues to bacterial invasion. Further, deep anaesthesia abolished the heat-regulating mechanism and caused an appreciable fall in body temperature. For these reasons, the speaker concluded that prolonged and deep ether anaesthesia was harmful, and was definitely contraindicated in cases of bronchitis and asthma. Except in the summer months ether should be given warmed. The relative immunity of private patients from post-anaesthetic pulmonary complications was ascribed by Dr. Shipway to the better nursing conditions after the operation. Hospital patients nursed in large wards were exposed to draughts and kept in an atmosphere that was not sufficiently warm, whereas private patients generally had a room the temperature of which could be kept at the optimum to suit the case. Again, the importance of obtaining a history of recent common cold, and of not giving an anaesthetic except in emergency when such a history was obtained, was not sufficiently recognized in hospital practice. Liability to bronchitis and pneumonia was very much less after non-abdominal operations, even though ether was given; further, pulmonary complications not uncommonly occurred after abdominal operations when a local or spinal anaesthetic had been given. From this it was evident that there was some factor for which the site of operation was responsible; this was, he thought, collapse of the lung, massive or partial. Pasteur, Whipple, Elwyn, and others had studied this subject, and concluded that collapse, usually partial but occasionally massive, of the lower lobes of the lungs was a common predisposing factor in the production of post-operative bronchitis and pneumonia. The mechanism of this collapse, whether due to reflex inhibition of the diaphragm, sudden blocking of the bronchioles by secretion, sudden reflex spasm of the bronchioles, or surgical paralysis of the abdominal muscles, was not clear, although recent observations pointed to a nervous origin. The value of local anaesthesia in preventing pulmonary complications had been challenged, but its growing use in America seemed to indicate that it was less dangerous, although the exposure involved in certain methods of local anaesthesia might be as great as that of general anaesthesia. For operations below the umbilicus Dr. Shipway advocated spinal anaesthesia combined with gas and oxygen or a minimum quantity of C.E. mixture. In 258 bladder cases anaesthetized thus only two died from pulmonary complications. Cyanosis and excessive secretion of mucus were harmful, and if the latter occurred hypodermic injection of atropine should be given after the anaesthetic. Expansion of the base of the lungs by breathing exercises should be begun twenty-four hours after the operation, and depressant drugs, such as aspirin and morphine, should be given as sparingly as possible, since pain had its use in promoting movement.

Mr. J. P. HEDLEY said that gynaecological operations were reputed to be more commonly followed by fatal pulmonary embolism than any others, but the records of St. Thomas's Hospital did not show any greater frequency in the gynaecological department than in the surgical. The figures of the Mayo Clinic showed 10 fatal cases in 7,993 gynaecological operations—about 0.12 per cent., while there were 23 in 12,229 operations on the gall bladder, liver, prostate, colon, and rectum, and for hernia—about 0.18 per cent. The great difficulty in the prevention of pulmonary complications after operation was that their causes were not definitely known. Some thought that nearly all the cases resulted from embolism, and others that they were due to disturbances of anaesthesia When a patient had a common cold the dangers of lung disturbances after anaesthetics were well known, so that Mr. Hedley saw no difficulty in assuming that many post-operative pulmonary complications were due to the stirring up of a latent infection of the lungs by the anaesthetic. Old people were particularly liable to post-operative lung complications. There were many arguments in favour of the embolic theory, notably that operations on certain regions of the body, even after local anaesthesia, were more likely to be followed by disturbances than others. But often after examination under an anaesthetic there had been pulmonary disturbances, while the freedom from these dangers after accidental wounds and fractures was striking. Assuming that most of these cases starting with bronchitis were due to the disturbance of the anaesthetic and certain predisposing causes, reasonable precautions could be taken. When the lungs were damaged either operation should be avoided or it should be performed under a local or spinal anaesthesia, and deferred if the patient had a cold. The temperature of the theatre should be 70° F., and after operation the patient should be protected from draughts and cold. At St. Thomas's a tent was placed over the trolley on which the patient returned to the ward, and strict rules were enforced about bed curtains. This had reduced the number of these "bronchitis" cases. The inhalation of vomit, mucus, or blood should be prevented while the patient was semi-conscious. When pulmonary complications developed later the only explanation seemed to be embolism or thrombosis. There was some evidence that particles of tissue detached by the operation were carried to the lung and held there by the lung capillaries. Thrombosis in veins near the seat of operation might be the source of emboli, and where even mild sepsis was present this likelihood was greater. Those cases where the patient had an attack of pain over a small area of the chest, followed by signs of pleurisy near this area, were fairly common. There was usually some evidence of mild infection of the wound, such as moderate disturbance of temperature, or vaginal discharge after total hysterectomy. The obvious way of preventing complications in this type of case was to avoid damaging or bruising tissues around the seat of operation. The treatment when an attack had occurred was by local applications to the chest wall and by keeping the patient at rest in bed. In those cases where sudden large pulmonary embolism occurred there was usually very little to attract attention beforehand, although there was often a mild disturbance of temperature. A patient who had suffered from haemorrhage before or at the time of operation was more liable to thrombosis. Starvation and excessive purgation before operation might both add to the risks of thrombosis in any part of the body. When patients were lethargic after operation there was increased fear of this complication. To prevent it operations for conditions such as uterine fibroids, which produced anaemia, should be performed before the patient had become very anaemic; loss of blood at operations should be properly controlled. Bruising of the tissues must be avoided by the greatest tenderness in handling.

Mr. Hedley thought that the old method of administering drastic purgatives before operation was useless and dangerous. Patients should be encouraged to move their limbs, and should be propped up in bed within a day or two of operation. He said that the dyspnoea and shock produced by a pulmonary embolus was due to the sudden embarrassment of the right side of the heart, and if the patient could be tided over the first few hours there was good chance of recovery. Blood-letting and the inhalation of amyl nitrite were the best methods of treatment, but morphine also was most valuable. Although in the routine management of post-operative cases the patients should be encouraged to move about, once it was thought that a clot had formed the patient should be kept absolutely at rest.

Lord DAWSON said that enormous improvements had taken place in anaesthesia in recent years, due to improved administration and better care of the patient. He thought that the anaesthetist was now seldom responsible for serious post-operative complications such as pulmonary embolism. Small infarctions, especially if deep, might give rise to no visible signs, and he suggested that they were more frequent

than was supposed and a frequent cause of post-anaesthetic bronchitis and pneumonia. If the infarction became infected a pneumonic patch was formed. It was interesting that the type of pneumococcus was almost invariably Type IV. While physical signs from a small infarction were almost absent, the symptoms might be very severe, and were possibly due to a form of shock. Emboli generally arose from the systemic veins, particularly the femoral and iliac, and only very rarely came from the auricles and valves of enfeebled hearts. These complications did occur after local anaesthesia.

Sir CHARLES GORDON-WATSON referred to a paper on this subject by Featherstone, who found that 10.8 per cent. of 222 consecutive severe abdominal operation cases developed pneumonia, whereas only 0.7 per cent. of 1,100 orthopaedic operations had developed this complication. There could be no doubt that operations on the upper abdomen were much more prone to produce pneumonia than any others, and this might be due, as Pasteur had pointed out, to the interrelation between the muscles of the abdominal wall and the diaphragm. During the war collapse of the right lung was very commonly seen after wounds in the abdomen. Collapse was followed by stasis in the collapsed lobe of the lung and then by infection. To prevent this, irritation by the anaesthetic should be avoided, and the experience of the war went to show that nitrous oxide gas and oxygen with some ether was the most satisfactory anaesthetic for the prevention of shock during the operation and post-anaesthetic lung complication. As regards pulmonary embolism, the figures at St. Bartholomew's Hospital tended to show that the massive type was increasing in frequency, although still happily very rare, there having been 32 deaths from this cause in 29,000 operations. Small infarctions were often indicated by a slight evening rise in the temperature. He thought that the clots which broke up and gave rise to small and possibly repeated infarctions were infected, whereas the clot responsible for the massive infarction was generally sterile. Clotting might be due to trauma at operation, stasis, and possibly the absorption of thrombokinase, and should be guarded against by avoidance of excessive loss of fluid and shock during operations, and by attention to posture during and after operations.

Dr. H. W. FEATHERSTONE said he had published figures showing the extreme frequency of post-operative pneumonia after operations on the upper abdomen, and the infrequency of this complication after prolonged operation on the head and neck. He felt that ether should not be specially blamed for these complications, and indeed considered intertracheal ether to be a very safe anaesthetic, very infrequently followed by pneumonia. In cases where pneumonia arose the previous history of the patient should be investigated. During influenza epidemics these complications occurred more frequently, and he therefore strongly urged the advisability of not performing severe abdominal operations at such times except in emergency.

Dr. ROBERT HUTCHISON considered that thrombosis was often postural and due to the adoption of the Fowler position, which also had the disadvantage of exposing the patient's chest. If this position must be adopted, the patient should be encouraged to wear a warm jacket, and "fresh air" must be allowed for the time to go "by the board."

SEPTICAEMIA AS A COMPLICATION OF MIDDLE-EAR INFECTION.

AT a meeting of the Section of Otology of the Royal Society of Medicine on February 7th, with Dr. J. KERR LOVE in the chair, Mr. G. J. JENKINS read a paper on septicaemia as a complication of middle-ear infection.

Mr. Jenkins said that the term "septicaemia" denoted an infection of the blood; clinically it implied a general infection, its severity ranging from a slight disease with apparently unimportant symptoms to a grave condition with a fatal termination. The one absolute proof of true septicaemia was the finding of organisms in the blood; he had encountered only two groups of organisms in true septicaemia—namely, streptococci and pneumococci. In his experience septicaemia, or the septicaemic state, was almost as common in acute middle-ear infection as any single intracranial complication. There was a real danger of failure to recognize the middle-ear infection in the early stages of septicaemia, when something might be done to save the patient. Septicaemia was probably more common with infections of the ear, nose, and throat (especially of the ear), than with inflammation of any other part of the body, including the pelvis. Intracranial complications of middle-ear disease were becoming less common, but he believed that the septicaemia in association with aural sepsis was less likely to disappear, occurring as it did in the very early stages of the infection. Septicaemia, or the septicaemic state, was more likely to be met with in children than in adults, and, he believed, more commonly in patients who had not previously had a gross lesion of the ear. Mr. Jenkins gave details of a typical case of the milder type of the septicaemic state, in which the aural symptoms and signs were so masked that he had at first believed that some other cause must be sought. In such cases, when septicaemia appeared the symptoms and signs of inflammation at the primary site of infection were profoundly modified. When the primary lesion was in the middle-ear tract the clinical appearances depended on the stage reached of the inflammation and the anatomical formation of the mastoid. If the incidence of septicaemia coincided with a later stage of inflammation, the appearances might be those of chronic suppurative middle-ear disease. As seen during an operation the appearance of the interior of the mastoid was characteristic: the "laking" of the pus in the larger cells, the thin, pale mucous membrane lining the cells almost normal in appearance, and the absence of congestion were characteristic of mastoiditis followed by a septicaemic state. Such an appearance at operation had on occasion suggested to him a diminished resistance, and this had been confirmed by a low leucocyte count. After operation the general symptoms predominated, and there was no evidence of reaction in the wound. A smear from the wound might show a few lymphocytes, polymorphonuclear cells, and a large number of organisms. In regard to diagnosis Mr. Jenkins attached a good deal of importance to the cytological examination of the blood, especially the leucocyte and differential counts. The value of the bacteriological examination of the blood was very great when the result was positive, but little when it was negative. As regards treatment, it was very important that the middle-ear condition should be thoroughly dealt with. In the majority of cases this involved the Schwartze operation and paracentesis; then came the question of the treatment of the general infection. Until recently Mr. Jenkins had been accustomed to give these patients large doses of normal horse serum as soon as possible, continuing this daily so long as necessary; lately he had been trying immuno-transfusion. His own experience of vaccine therapy had been unfortunate. Mr. Jenkins wished to draw the attention of general physicians to the importance of examining carefully the ears, nose, and throat when a patient was in this septicaemic state.

Nerve Anastomoses.

Mr. LIONEL COLLEDGE and Dr. L. D. BAILEY exhibited a kinematograph film illustrating anastomosis of the facial nerve in cases of facial palsy. The film consisted of four parts: the first part showed a typical case of facial palsy, and the three subsequent parts showed three cases of nerve anastomoses for facial palsy, after operation. The film brought out well the slight differences still remaining in the movements of the opposite sides of the face, and clearly showed how re-education of the affected side was effected after nerve anastomosis. The value of the kinematograph in demonstrating post-operative results and the signs of affections of the nervous system was strikingly exhibited, the photography being excellent.

In the first case of nerve anastomosis shown, a girl aged 17, the reaction of degeneration had been still complete, with no evidence of recovery, at the end of six months after an operation for suppuration in the labyrinth and meningitis. The facial nerve was anastomosed end to end with the whole of the central end of the hypoglossal, and the peripheral end of the hypoglossal was implanted laterally into the spinal accessory. The film showed the state of the face three years after nerve anastomosis; faradic response was present in all the facial muscles. In the second

case, a man aged 27 had a complete facial palsy resulting from a radical mastoid operation performed in India two years previously. The facial nerve was anastomosed to the whole of the central end of the hypoglossal. The descendens noni was divided and its central end was united with the peripheral end of the hypoglossal, the peripheral end of the descendens noni being implanted into the side of this junction. The film showed the state of the face fifteen months afterwards; faradic response was present in all facial muscles. The third case was that of a woman aged 56, who had a complete facial palsy after a radical mastoid operation. The facial nerve was attached to the central end of the descendens noni, and the peripheral end of the descendens noni implanted into a slit in the side of the hypoglossal. The film showed the state of the face after twelve months; there was faradic recovery of all the facial muscles.

THE CONTROL OF TUBERCULOSIS AND THE MILK SUPPLY.

A MEETING of the Sections of Epidemiology, Comparative Medicine, and Disease in Children of the Royal Society of Medicine was held on February 9th, the chair being occupied by the President of the Section of Comparative Medicine, Professor F. T. G. HOBDAY.

Dr. JOHN ROBERTSON (M.O.H., Birmingham) said there was a widely divided amount of scientific medical opinion as to the part played by tuberculosis of bovine origin in the production and dissemination of the human disease. Some estimated that 3,000 human lives were lost annually owing to tuberculosis of bovine origin, and probably many thousands of children had other forms of tuberculosis due to the bovine bacillus which, though not fatal, caused crippling, glandular enlargements, etc. On the other hand, some experienced physicians held that the mild invasion of the bovine bacillus conferred just that amount of immunity which saved enormous numbers from acute tuberculosis of human origin. He emphasized the close clinical, pathological, and etiological resemblances existing between the lesions and the progress of the disease of the two kinds; the same predisposing factors also operated. Birmingham had attempted three methods. One was the testing of samples of milk for the presence of tubercle bacilli and the elimination of cows returned as positive. Another was an offer to farmers to test their herds free of charge if they would eliminate reactors. Thirdly, they had instituted pasteurization of milk with the view to limiting the amount of milk which was infected. Of the churns of milk sent into Birmingham during the past eighteen years 8.7 per cent. contained living tubercle bacilli, and the percentage so contaminated now was less than eighteen years ago. Many cows were eliminated as "wasters," and for this a small compensation was paid to the farmer as an inducement to have these animals quickly slaughtered. Before the war, as a result of the efforts of the city council, twenty-eight herds supplying milk to the city were free of tuberculosis, and many farmers at that time asked to come into line with the scheme. The results of the application of the tuberculin test by an experienced officer were very satisfactory, and for cowshed work it was quite reliable. On the average in dairy herds the reactors numbered 30 per cent. of the whole. His recommendation had been to pasteurize and bottle the milk, largely based on the great success achieved in cleansing the milk supply in America. He had never found living tubercle bacilli in milk which had been efficiently pasteurized. Of the milk supplied to Birmingham 70 per cent. had been sufficiently heated to kill tubercle bacilli, and he hoped that in a few years no milk would be supplied in the raw state except from tested herds. He thought persons handling milk should be examined once a week to ensure that they were free of disease. There was much needed here a careful investigation as to the merits of pasteurization and sterilization, and whether boiling destroyed or greatly diminished the vital properties of milk. During ten years Birmingham had 1,000 fewer cases of pulmonary tuberculosis notified, and the deaths from non-pulmonary tuberculosis were now only half the general rate for England and Wales.

Lieut.-Colonel BRITTLEBANK (veterinary officer, Manchester) said the main fact for consideration in this discussion was that the tuberculosis of bovines was transmissible to human beings, and there was a good deal of evidence that such infection from bovine sources was, in many cases, of more virulent type than that originating from another human. The associated economic problem as it affected agriculture was one of great importance, and it was upon that industry that the cost would largely fall. Roundly, there were in Great Britain 7½ million head of stock, 3 million being cows and heifers in milk or in calf. On the average, one-third of these were tuberculous, so that a million head of the dairy stock of the country were tuberculous in some degree, as ascertained by the tuberculin test. Some considered that encapsuled lesions of tuberculosis were a source of protection to the animals, and that the bacilli were frequently discharged into milk without there being detectable disease of the udder. But it was important to bear in mind that udder infection was usually secondary to lesions in the thorax, abdomen, and elsewhere in the body. Approximately 10 per cent. of the samples of Manchester milk examined during the past twenty-three years caused tuberculosis experimentally, and the percentage of farmers sending tuberculous milk into the city was higher in 1923 than it was in 1901. On 800 farms sending tuberculous milk, 597 cows were found to have tuberculosis of the udder, and when the disease was ascertained they were removed from the source of supply. In regard to more than 200 cows, there was ample evidence that just prior to the visit of the inspector they were disposed of to dealers. He believed that, as a general rule, the public would continue to buy the milk which was cheapest. The animals which earliest reacted to tuberculin were those giving the greatest quantities of milk—that is, those which worked the hardest. He advocated breeding their own stock, and stopping importation of strange cows, as one infected animal quickly carried its bad effect to the herd. That was carried out on one farm, and there was an increase of milk yield per cow per year of 200 gallons; moreover, on that farm there were no cases of contagious abortion. He had visited 136 farms: 6 were clean, 52 fairly clean, 78 dirty. At only 5 of the farms was there satisfactory provision for storage of manure, at 12 it was less satisfactory, and in the remainder such provision was either absent or very unsatisfactory. Of 346 cowsheds examined, 10 were clean, 147 fairly clean, the remainder dirty. He had ascertained that just prior to some of his visits farmers had sold tuberculous cows at prices ranging from 10s. to 35s. each. He said he hoped the Tuberculosis Order would soon be reintroduced, and would be so amended that it would require the inspection of every dairy farm in the country, without awaiting notification of disease. It was a waste of public money to pay compensation for infected cattle; it should be regarded as a crime for any man to be found in possession of such an animal on his farm. He believed there was no method by which really dirty milk could safely be made fit for human consumption.

Professor S. L. CUMMINS agreed that wherever in the world there was a practical absence of tuberculous cattle, there the human type of the disease was of a very grave and acute character; that was the case in large tracts in Africa, and in India. Thus, by concentrating on getting rid of tuberculosis one might possibly be doing harm; yet if this idea were disseminated, it might be retorted that thereby retrogressive farmers were being sustained in their attitude. Hence it was undesirable to make public any but well ascertained facts. He did not think sufficient attention was paid to the quantitative aspect of the question. Cobbett related that the Royal Commission reported the fact that the dose of tubercle bacilli which could infect a cow when ingested was infinitely larger than the dose needed to cause the disease when inhaled. Was not the aim of getting rid of all the bacilli from milk therefore rather theoretical? He believed the mixing of milk was of great importance in the prevention of tuberculous disease from that source, the uncontaminated milk acting as a wholesome diluent. It was said that 25 per cent. of the samples of London milk contained some tubercle bacilli, and guinea-pig experiments were positive with those samples, so that the safety of the milk as a whole must have been greatly increased by the mixing of milks. From 60 to 80 per cent. of the adult general population reacted to tuberculin, yet no doctor hesitated to advise mothers to suckle their children, without an examination previously to giving the advice, unless they were obviously ailing. The whole production of milk was a very artificial matter,

following on the breeding of cattle with this object in view, and the manipulations of the udder in frequent milking might tend to activate lesions there which would never have developed otherwise. He thought the gold salt recently discovered and tried in Copenhagen held out a hope of the cure of tuberculosis. He advocated a closer co-operation between the medical and veterinary professions in this matter.

Dr. NIVEN (late M.O.H., Manchester) related his experiences in this connexion in Oldham, and later in Manchester. At the former town he was responsible for the issue of a circular advising that all cow's milk should be boiled before use, and when he went to Manchester in 1894 he took the same course. The milk then supplied was so dirty that he could think of no other way of saving the people from the effects of drinking such a fluid. He referred to the able assistance given in the crusade by Professor Delépine. There were also instituted in Manchester classes of senior girls for instruction on the care and feeding of infants. He agreed that once tuberculosis was imported into a previously tubercle-free herd, the spread among the other animals was very rapid. Great precautions were needed to keep a herd free from the disease. In America the control of the milk supply was much more successful than in this country, and a large factor in the more satisfactory serving of the milk was the free use of ice, which would be a factor of much greater difficulty here. He expressed the hope that the programme put forward by the Astor Committee would be energetically put into operation by the Ministry of Agriculture. In New York the milk coming into the city was graded, three degrees being recognized, and he asked whether some such system might not be brought into operation in the largest cities here. Perhaps the country was not yet ready for such a measure, but it was likely that in five years something of the sort might be possible. There should be a corps of veterinary inspectors visiting all the farms which were supplying milk to cities, and reports should be regularly furnished by them to the city committees responsible for these matters. He believed greatly in the education of all who were concerned in the milk industry, both by tuition and, where needed, by coercion. In America the various States vied with one another in sending pure milk, and the authorities there did all they could to assist farmers to perpetuate the best stocks.

The discussion was adjourned to March 2nd.

THE TREATMENT OF LYMPHADENOMA.

AT a meeting of the Medical Society of London, held on February 9th, with the President, Dr. EUSTACE M. CALLENDER, in the chair, a discussion was held on the treatment of lymphadenoma.

Sir THOMAS HORDER opened the discussion by explaining that he had recently had under his care two patients suffering from lymphadenoma of the Pel-Ebstein type who were alive and well some considerable time after the illness first commenced. He considered that the treatment adopted in these cases was of general interest in that, he believed, no previous case of cure of this type of the disease had been recorded. The first case was that of a man, aged 47, whose illness commenced insidiously in 1918 with periodic bouts of pyrexia. These were found to be of a regular periodicity, occurring every fourteen days; on examination, both between and during the attacks, nothing definite could be found. Spending the winter abroad had no effect on the disease, and at the end of eighteen months an exploratory laparotomy was performed, mainly because of some rather vague symptoms in the region of the liver. Nothing abnormal was found, except some adhesions round the gall bladder and round the appendix, which was removed. A temporary cessation of the attacks of fever, lasting for six weeks, followed, and a second operation produced no improvement. In 1922 arsenic treatment was instituted and neokharsivan was given intravenously in increasing doses at intervals of five days, followed by applications of *x* rays to the liver. The next attack of fever was abortive, but the following one was as severe as ever, and the attacks continued, although the rhythm was not so regular. Further applications of *x* rays were made, but the condition remained unchanged, and a course of "protein shock" therapy, consisting of intravenous injections of peptone, was without effect. Another intensive course of neokharsivan was next tried, with *x*-ray applications simultaneously, glucose being given by the mouth to avert any toxic symptoms. The next bout of fever was abortive after an interval of thirty-eight days, and one other attack, after fifty-two days, was the last the patient had had. Since January, 1923, he had been hard at work, retaining his weight. A third series of neokharsivan injections and *x*-ray treatment was given early in 1923, although the symptoms had all disappeared. The second case was also of the Pel-Ebstein type, but the pyrexia was not so sharply marked off, the rises of temperature being more gradual and the falls more irregular. This patient, a man aged 41, was admitted to St. Bartholomew's Hospital with symptoms and signs suggesting a subphrenic abscess. An operation revealed nothing abnormal in the abdomen, and it was particularly noted that the spleen appeared to be quite normal. In view of the curious rises of temperature and an *x*-ray discovery of enlarged glands in the thorax, the patient was given a course of *x* rays and later a combined course of neokharsivan and *x*-ray treatment. The patient left the hospital apparently cured, but returned a year later with similar symptoms, which responded to the same treatment as before, and the patient had been back at his work for some considerable time. In the general consideration of the treatment of these conditions Sir Thomas Horder thought that several questions arose. In the cases he had described, was the arsenic or the *x* rays responsible for the favourable results? He thought the *x* rays were of greater value, but that probably a combination of the two forms of treatment was desirable, if not essential, in cases of this type. If both were desirable, what was the best method of combination? He thought synchronization was most efficacious. With regard to dosage, arsenic must be used boldly and the question of liver damage must be settled for each individual case; the best route for the arsenic was the intravenous. The dosage of *x* rays he left to subsequent speakers, and while he had had no experience of radium in the Pel-Ebstein type of case, he had treated nodal cases of lymphadenoma with radium with marked benefit. He referred briefly to other forms of treatment which had been used in this disease.

Dr. ROBERT KNOX described the treatment by *x* rays of the first case referred to by Sir Thomas Horder. At first he had used slightly filtered rays over a large area of skin, but when it became obvious that a lengthy treatment was required he had advised that the filters and the voltage should be increased so as to prevent damage to the skin and to reach the deeper structures. Discussing *x*-ray treatment of lymphadenoma in general, Dr. Knox described the surprisingly rapid disappearance of swellings followed by a period of apparent cure, after which a relapse followed. *X* rays gradually seemed to lose their effect until finally a relapse occurred where the swellings would not respond to treatment, and a fatal termination was not long delayed. *X* rays gave the best results in glandular and mediastinal growths, and radium if deeper structures were involved. He considered that the dosage of *x* rays should not be excessive. Small doses at short intervals over a long period gave the best results, and this treatment should be continued for some considerable time after an apparent cure had been obtained. He thought that the control of this disease by radiations was probably due to some biochemical action through the blood stream; hence he believed that simultaneous injections of arsenic were of great value. Cases must be observed very carefully during treatment, and close collaboration between the clinician and the radiologist was of the greatest importance.

Dr. F. PARKES WEBER emphasized that one of the fundamental problems in lymphadenoma was diagnosis. The pathology of the condition had been carefully worked out, and he considered that statistics as to the disease were urgently needed. These statistics should show the grounds on which diagnosis had been made and the nature of the treatment adopted. He criticized the diagnosis in both the cases reported by Sir Thomas Horder. In the first case there were no enlarged glands anywhere, and in the second case the spleen was normal and the only enlarged glands

were those radiologically detected in the thorax. Dr. Weber referred to certain bad effects sometimes produced by radiation treatment where, although local swellings decreased in size, the general condition of the patient became much worse, and often a fatal termination rapidly ensued.

Dr. A. S. MACNALTY reported two cases of lymphadenoma where beneficial results had been obtained by the use of arsenic in the form of Fowler's solution. One case was still quite well after four years. In his opinion *x*-ray treatment did not seem to have any permanent beneficial effect.

Dr. J. H. DOUGLAS WEBSTER agreed that diagnosis was vitally important. He recorded some cases where tuberculosis and lymphadenoma existed in the same patient, and one case with a rather indefinite pathological condition, a gland removed during life proving later to be lymphosarcoma. He suggested that it would be very interesting to try the effect of *x*-ray treatment during the febrile attacks, for certain observers had reported that radiations had more effect at higher temperatures. He reported one case treated with both radium and *x* rays; while radium produced quicker results, relapses occurred at shorter intervals.

Sir THOMAS HORDER, in reply, expressed surprise that any doubt should be thrown upon the nature of the disease in the cases he had described. At autopsies on similar cases where glandular enlargement had also been absent quite definite changes had been found in the liver characteristic of Hodgkin's disease. All stages of the disease existed between simple local glandular enlargements and cases such as he had described. There were, in fact, many lymphadenomata, and he considered the results of the treatment he had described of value, since a new discovery with regard to treatment of uncommon cases often led to improved methods of treatment of the more common varieties.

TETANY.

A MEETING of the Royal Medico-Chirurgical Society of Glasgow was held on January 26th, the Vice-President, Mr. JOHN PATRICK, in the chair.

Professor LEONARD FINDLAY in opening a discussion on tetany recalled briefly some of the outstanding events in the history of the disease. Although convulsions during the dentition period had been known to Hippocrates and Galen, it was only at the beginning of last century that tetany was first appreciated as a distinct entity when Clarke, in 1815, devoted a chapter of his book *Commentaries on Some of the Most Important Diseases of Children* to "a peculiar species of convulsion in infant children." In 1860 Trousseau once more described the three signs of carpopedal spasm, laryngismus stridulus, and convulsions as manifestations of one disease. In 1874 Erb described the increased electrical excitability, and in 1876 Chvostek noted the increased mechanical excitability of the peripheral nerves, both of which phenomena were of great value in detecting the latent stage of the disease. Professor Findlay then referred to the various hypotheses as to the pathogenesis of the disease and to the relationship of idiopathic tetany to tetania parathyreopriva. He concluded by describing the investigations of Professor Paton and himself which had led them to the adoption of the guanidin intoxication hypothesis.

Dr. STANLEY GRAHAM then discussed briefly the main theories regarding the etiology of tetany as suggested by various workers from a study of the blood chemistry. The four main hypotheses held at present were: (1) guanidin intoxication, (2) disturbance of the ratio of sodium and potassium to calcium and magnesium, (3) calcium deficiency, and (4) alkalosis. With regard to the guanidin intoxication hypothesis, he was of the opinion that until more accurate methods for the estimation of guanidin were devised little further confirmation could be obtained. The action of sodium and potassium as irritative salts and of calcium and magnesium as sedative salts had been known for many years, and it had been suggested by several workers that a relative increase of the irritative or decrease of the sedative salts in the blood would account for the increase in the excitability of muscle. He considered that though theoretically such disturbance of the ratio could be responsible for an increase in electrical excitability of the muscle, it seemed to play very little part, if any, in the production of tetany as seen clinically. The association of a diminished calcium content in the serum with certain forms of tetany he had found to be by no means constant, and in two recent cases of active tetany the calcium content had been normal. Also in other forms of tetany—gastric and hyperpnoeic—the calcium content might be normal. In uraemia with a low calcium content no instance of tetany had been recorded. The disappearance of the signs of tetany after the administration of calcium chloride, supposed to be due to the supply of calcium ions, was now considered to be due to the acidosis produced. Ammonium chloride had been found to be as effective as the calcium salt, while calcium lactate failed to relieve the tetany. The acidosis of a gastro-enteritis had been found to cause the signs of tetany to disappear. Dr. Graham concluded by discussing the alkalosis hypothesis in its relation to the various types of tetany, and showed that while it was greatly concerned as a factor in all the types of tetany it was unlikely to be a causative factor. A toxic factor in the presence of an alkalosis might account for many of the symptoms, but such hypotheses at present lacked substantial confirmation, and the part played by the phosphorus was also deserving of further investigation.

In the unavoidable absence of Dr. GRACE H. ANDERSON, Professor Findlay read her contribution on the treatment of infantile tetany. Some of the earlier methods of treatment were first described and the reasons for their failure discussed. Dr. Anderson then went on to describe the mode of administration of calcium chloride adopted by her. In the active stage, with the three cardinal symptoms present, it was best to give the drug in 30-grain doses every four hours till all symptoms had disappeared. It was found that the urgent symptoms disappeared after one or two doses, but the latent signs took two or three days to vanish. In the latent stage of the disease smaller doses could be given and continued over a longer period. The drug was well tolerated by infants, though the disagreeable taste made the tablet form preferable in older children. Dr. Anderson concluded by referring to the treatment of tetany by ultra-violet radiation.

In the discussion which followed Dr. G. H. CLARK agreed that some form of intoxication was responsible for tetany, with probably an alkalosis as an important or even determining factor. He found it difficult, however, to support Dr. Findlay in blaming the parathyroid gland for idiopathic tetany, and believed the cause to be gastro-intestinal. He thought it unlikely that a disease showing practically the same symptoms in adults and in children should have a parathyroid origin in the latter and not in the former, and no one suggested that parathyroid disease was the cause of tetany in cases of dilated stomach, cholera, or enteric fever. Diseases of endocrine origin were uncommon and not readily amenable to treatment, whereas idiopathic tetany was by no means uncommon and was fairly readily cured. Dr. Clark then referred to a case of true parathyroid disease which had yielded to the administration of dried parathyroid extract.

Dr. ADAM referred to the treatment of a large number of cases of laryngismus stridulus. He compared this condition with asthma of the larynx, and mentioned the toxaemic factor associated with asthma. He had found also in spasmophilic children an eosinophilia similar to that in toxaemia. He referred also to the importance of diet in the treatment and to the part played by carbohydrate excess.

Deep X-ray Therapy.

Dr. JAMES R. RIDDELL described briefly a series of five cases of malignant disease of the throat and mouth which had been treated by deep *x*-ray therapy. Two of the patients were shown to the society.

1. Epithelioma of the lower jaw and gum—confirmed by pathological report—treated with three doses of *x* rays by the Erlangen method over a period of five months. No recurrence since healing took place eighteen months ago.
2. Tumour of left vocal cord, clinically malignant, treated by two doses. Had remained well for twenty months.

3. Ulcerating tumour in region of left vocal cord and anterior commissure involving the subglottic region. Treatment was commenced in August, 1924, and had been followed by complete disappearance of the tumour, restoration of function, and marked improvement in general health.
4. Alveolar carcinoma of left tonsil and soft palate and gum treated by three doses of deep therapy with apparent cure, but recurrence followed on the hard palate within a fortnight, for which radium was used. The patient had remained well for one year.
5. Sarcoma of right maxilla—confirmed by pathological report—treated by both radium and deep therapy. Patient had been well for six months.

Dr. HOWIE had found the results of the Erlangen method somewhat inconstant: some patients did well and others did not. He thought that the treatment should be commenced as early as possible. Some of his patients had complained of thirst after the treatment, owing probably to interference with the salivary glands.

Dr. ADAM considered that the results with the Erlangen method would be much improved when the control of the dosage could be more accurately determined. He had had some very good results in sarcoma of the mediastinum. In malignant disease of the mucous membrane radium gave excellent results at first, but recurrence was common; he had found radium more effective in sarcoma. Professor TEACHER inquired as to the extent of the reaction produced by the method. Mr. PATRICK referred to the difficulties of operative interference after deep therapy from the presence of a very hard, tough slough, and from the slowness of healing afterwards.

Dr. RIDDELL, replying, emphasized the importance of regulating the dosage with a view to the avoidance of delayed necrosis; this had been noted in some cases as long as eighteen months after treatment had ceased.

GASTRIC SURGERY.

AT a meeting of the Ulster Medical Society held in the Medical Institute, Belfast, on January 22nd, with the President, Dr. DARLING of Lurgan, in the chair, Mr. P. T. CRYMBLE read a paper entitled "Gastric surgery—the selection of patients and the operative treatment of the various pathological conditions of the stomach and duodenum." The paper was illustrated by diagrams, models, specimens, and lantern slides. Mr. Crymble gave an analysis of the principles that should guide the selection of each type of operation, and discussed the value of the various signs and symptoms and the question of local anaesthesia. The following were the conclusions drawn:

1. The *x*-ray examination surpasses all other methods of investigation in separating the medical and surgical dyspepsias.
2. A fractional test meal should precede any operation on the stomach or duodenum, and the type of operation should depend on the result. In hypoacidity sleeve resection or gastro-enterostomy or limited gastrectomy would be indicated. In hyperacidity a more complete gastrectomy (half to two-thirds) is indicated. The medical dyspepsia—hyperchlorhydria—might be adequately treated by pyloroplasty.
3. Gastric ulcer should be treated by some form of gastrectomy or sleeve resection with gastro-enterostomy.
4. Sleeve resection alone leads to stasis in the lower pole.
5. In regard to duodenal ulcer an open mind should be kept, and it should be recognized that gastro-enterostomy may not be the last word in surgical treatment. Prolonged investigation of post-operative conditions is required to estimate the value of: (*a*) local excision or duodenectomy *plus* gastro-enterostomy; (*b*) extensive gastrectomy; (*c*) end-to-side gastro-duodenostomy.
6. Splanchnic anaesthesia has increased the scope of gastric surgery, and operations lasting three hours may be safely performed.
7. Cancer of the stomach should be tackled with more vigour. The surgeon should attempt to remove the tumour, the gastric lymph glands, the glands around the coeliac axis and the great omentum. Portions of the pancreas and mesocolon may be safely removed.

The following members took part in the discussion of the paper: Dr. CALWELL, Dr. MCKISACK, Dr. MORROW, Mr. MITCHELL, Mr. HALL, Mr. PURCE, Mr. IRWIN, Dr. MAITLAND BEATH, Dr. FIELDEN; and Mr. CRYMBLE replied.

Reviews.

ORTHOPAEDIC SURGERY.

IT is claimed for Professor POTEL of Lille that in his *Traité pratique d'orthopédie*[1] he for the first time has attempted to give a pathological classification of various malformations. We can hardly admit this claim without considerable qualification when we remember that W. J. Little wrote as follows in his book on deformities, published in 1853: "I prefer a classification that is allied to the *anatomical*, namely, one founded on *the pathology of deformities*," and that a similar method has been followed by others, such as A. H. Tubby. Nevertheless, in no recent book on this subject with which we are acquainted has the importance of pathology been so strongly insisted upon, even perhaps to the extent of risking some neglect of the study of treatment. More than half this work is concerned with congenital malformations, the remainder being devoted to the consideration of those which are generally characterized as acquired.

Professor Potel, justly, in our opinion, allows very little influence to amniotic bands and adhesions in the causation of congenital deformities, but attributes defects of limbs or parts of limbs and congenital club-foot to lesions of the embryo. The last-named deformity he considers to be due to a muscular dystrophy (to use his own phrase) resulting in a want of growth and consequent shortness of certain muscles. This pathology fits in well with the experience of those surgeons who have noted the tendency of such deformities to reappear after apparently complete correction. The hypothesis of a radical defect in the embryo seems best to accord with the known facts. Potel attributes congenital torticollis to a similar cause, and rejects the theory of birth injury; he would reckon tumour of the sterno-mastoid as the result and not the cause of the shortened muscle and the consequent wry-neck.

Congenital dislocation of the hip is so common a deformity in Northern France that a full consideration of it is to be looked for in a French work on deformities. Le Damany, whose views on its etiology are adopted by Professor Potel, estimates that there are 200,000 cases in France. In Italy, again, at least 1,000 cases are treated every year at Bologna and Milan; while in London, which it may be estimated draws its cases from a population of 10 million, probably not more than 100 cases are treated annually in all hospitals, special and general. Le Damany's estimate of one case to one thousand white females does not apply to the inhabitants of Great Britain.

Meningocele, encephalocele, and spina bifida are very fully described and well illustrated with coloured plates. The section on sacralization of the fifth lumbar vertebra and the symptoms to which this abnormality gives rise should be useful, but it is a pity that no drawing or *x*-ray picture accompanies it.

Livre II, which is devoted to acquired malformations, gives adequate accounts of scoliosis and kyphosis and their treatment. In a note to the chapter on Pott's disease the author quotes a most interesting description of the disease, given by Jacques Dalechamps of Lyons in 1566. This writer appears to have described two hundred years before Pott all the chief symptoms of tuberculosis of the spine, including pressure paraplegia. We should like to know more of this old pathologist and something of his methods. Professor Potel discusses rickets, including coxa vara and flat-foot, at considerable length, and the chapter is very fully illustrated, but not one figure is devoted to any representation of a splint or any other mechanical means of treatment, such as plaster-of-Paris, and the allusions to such appliances are very cursory. In the section on deformities of traumatic origin we are disappointed to find no reference to those following fractures about the ankle which have such a disabling effect. Apparently Professor Potel does not consider such deformities as within the scope of a work on orthopaedics, nor does he pay much attention to the effects of arthritis deformans and similar chronic

[1] *Traité pratique d'orthopédie.* Par Dr. G. Potel. Paris: G. Doin. 1925. (Roy. 8vo, pp. 111 + 723; 399 figures. Fr. 80.)

joint diseases. When, however, complete ankylosis of a joint exists the operative measures to be taken are adequately described. The final chapter, on the treatment of cicatricial deformities, contains much of value.

Despite omissions, to some of which we have called attention, Professor Potel's book is valuable and suggestive. It is pleasantly written with a sense of humour, as when the author quotes Reclus as saying that there are no vicious unions (of fractures), only vicious surgeons, and the saying of Broca that, having translated bone-softening into Greek and thereby produced osteomalacia, some surgeons seem to be content to go no further.

The little book by Mr. A. H. TUBBY, entitled *The Advance of Orthopaedic Surgery*,[2] consists of six articles written by him for the *Clinical Journal*. It is intended to act as a kind of supplement to his book on deformities, and to set forth to the public some of the chief advances that have been made in orthopaedic surgery during the last twelve years. He lays stress on the value of radiographs, and properly insists on the importance of obtaining and studying stereoscopic plates or prints. Sacralization of the lumbar vertebrae, which is easier diagnosed than cured, recent views of spondylolisthesis, congenital dislocation of the hip, the Legg-Calvé disease of the hip, apophysitis, and postural irregularities are briefly touched upon, as is the treatment of the deformities of flaccid and spastic palsies in infants and young people. There is a chapter on reconstructive surgery, and one on re-education and on the teaching and future of orthopaedic surgery. The book will be useful to those who are not familiar with recent orthopaedic literature or with the larger works on orthopaedic surgery which have been published in this and other countries since the war.

The author states as his reason for specifying the last twelve years as the period covered by these advances the fact that the second edition of his own work on deformities appeared in 1912 and that "no authoritative and exhaustive treatise has been published in this country since then." He seems to have entirely overlooked the fact that *Orthopaedic Surgery*, by Robert Jones and R. W. Lovett, was published in London in 1923, and that the seventh edition of Royal Whitman's book with a similar title was published here by Henry Kimpton last year. Both these works were reviewed at some length in our pages, and the former at any rate attracted, as it deserved, considerable attention.

THE ANAEMIAS AND THEIR TREATMENT.

THE latest addition to the Bibliothèque des Grands Syndromes, a series of works appearing under the direction of Dr. H. Roger, Dean of the Faculty of Medicine in Paris, is a contribution on the subject of anaemia[3] from the pen of Dr. R. J. WEISSENBACH of Paris, who is already well known for his researches on haematology.

Dr. Weissenbach has written an excellent study of the various kinds of anaemia—a study at once comprehensive and concise. His book is intended primarily for the general practitioner; and this purpose has never been lost sight of. The introductory chapters comprise a review of the various underlying physiological considerations, and go on to treat of the various clinical types of anaemia, which are clearly described and contrasted. The anaemias arising in childhood and at adolescence are dealt with, as are those due to malfunctioning of the ductless glands, to syphilis, and to blood and intestinal parasites. There is a consideration of the anaemias arising in the course of pregnancy, both the common mild variety and the "anémie pernicieuse de la grossesse." The treatment of these various forms occupies about a third of the book. The underlying principles are enunciated, the methods pursued fully described, and the appropriate dietetic régime indicated. Drug therapy and opotherapy are discussed at length. The indications and contraindications for the use of iron and other medicines are considered.

The technique of blood transfusion is minutely described and various methods contrasted. The author describes at length his own method of administering repeated injections of citrated blood subcutaneously. He does not intend this to replace the classic blood transfusion carried out in profound anaemia associated with severe haemorrhage in which the symptoms demand immediate relief, but advocates it in the course of chronic anaemias. It is contended that this procedure is free from the mischances occurring from time to time in the "major" transfusions. Moreover, the repeated bleedings to which the donor is subjected bring about a hyperactivity of his blood-forming organs and communicate thus to his serum special blood-manufacturing properties.

In his introduction to this eminently useful work Dr. Weissenbach considers the two chief factors in the production of anaemia—the etiology on the one hand, and the particular soil in which this cause becomes operative, the latter depending on the age of the patient. These two factors of the utmost practical importance have been clearly envisaged throughout this study.

REFRACTION.

ANYTHING that tends to improve the practice of ophthalmology is to be welcomed, and so we extend a cordial welcome to Mr. GOULDEN's new book on *Refraction of the Eye*.[4]

There are already a number of books on this subject in our language; some of them have run through many editions and are deservedly popular with students; but there was need of a book in which the physiological optics of the subject was adequately treated, and Mr. Goulden's new book admirably fills the gap. No amount of reading can make a man a refractionist; but it is most important that all who have to prescribe glasses should understand the underlying optical principles, otherwise there is a real danger of the work being done in a rule-of-thumb manner, a thing detrimental to the advancement of ophthalmology.

This book is the outcome of the course of lectures delivered from time to time at Moorfields Hospital to candidates for the D.O.M.S. Some knowledge of mathematics is necessary and the "geometrical method of exposition has been used as far as possible"; this, according to Sir JOHN PARSONS, is the least unpalatable method. In this book, the first chapter is devoted to optics; the second deals with the optical constants of the eye, and the third with the eye as an optical apparatus; these three chapters occupy 92 pages. The next 51 pages are given to errors of refraction; a chapter on the ophthalmoscope follows, and the final chapter deals with the function of convergence and muscular anomalies. A good index completes the work. Mr. Goulden has succeeded in presenting the essential points of his subject clearly and in an intelligible manner, and those parts of the book which deal more particularly with the practice, as opposed to the theory, contain much sound common sense.

The get-up of the book is admirable; printing and paper are excellent, and praise must be given to the illustrations. The increasing number of candidates for the special diplomas in ophthalmology makes it certain that the book will achieve popularity, for it contains all that such candidates need.

STATISTICS—AND POTATOES.

PROFESSOR RAYMOND PEARL's *Studies in Human Biology*[5] consists of a revision of memoirs published by him during the last twenty years, with some additional matter, all being arranged in sequence. The first part, dealing with man as an animal, is mainly anatomical; its chief content is a study of the weight of the human brain,

[2] *The Advance of Orthopaedic Surgery.* By A. H. Tubby, C.B., C.M.G., M.S.Lond., F.R.C.S.Eng., F.S.A. Reprinted from the *Clinical Journal*. London: H. K. Lewis and Co., Ltd. 1924. (Cr. 8vo, pp. xii + 144; 31 figures. 7s. 6d. net.)

[3] *Les Syndromes Anémiques et leur Traitement.* Par Dr. R. J. Weissenbach. Bibliothèque des Grands Syndromes. Paris: G. Doin. 1924. (Roy. 8vo, pp. 372. Fr. 25.)

[4] *Refraction of the Eye, including Elementary Physiological Optics.* By Charles Goulden, O.B.E., M.A., M.D., M.C.Cantab., F.R.C.S. Introduction by Sir John Herbert Parsons, C.B.E., F.R.C.S., F.R.S. London: J. and A. Churchill. 1925. (Demy 8vo, pp. xi + 276; 180 figures. 10s. 6d. net.)

[5] *Studies in Human Biology.* By Raymond Pearl. Baltimore: Williams and Wilkins Company; London: Baillière, Tindall and Cox. 1924. (Med. 8vo, pp. 653; 125 figures. 8 dollars.)

which originally appeared in *Biometrika* and is a fine example of pure biometry. The second part deals with various aspects of vital statistics, and includes a demographic study of the American peoples, which is an admirable piece of work. The third part contains various studies of medico-statistical problems, and includes a witty and provocative paper on the statistical evaluation of public health activities. We will not refrain from quoting the concluding paragraphs.

"May I close with an illustration which may serve as a warning of the dangers of the statistical method? In 1881, before the diphtheria bacillus had been discovered, there appeared in one of the leading medical journals of Germany, by an author of standing, a paper apparently proving, or at least making apparently highly probable, the conclusion that the eating of potatoes was the cause of diphtheria! It was shown, by conventional statistical reasoning, that the disease first appeared in Europe near the close of the 16th century; that it appeared *after* potatoes were introduced as an article of diet; that the disease had increased concomitantly with, and at about the same rate as the increase in the consumption of potatoes as food; that the most severe epidemics of diphtheria occurred at the time of the planting and the harvesting of potatoes; children from 2 to 3 years of age were particularly attacked because they played with the potatoes at the time of sowing and harvesting, while the older children were in schools; in one region, Schmalkalden, diphtheria was rarer than in another, Malstatt-Burbach, otherwise similar, because in the former place potatoes were bought in small quantities and immediately consumed, while in the latter place large quantities were laid in, and the people came more often in contact with spoiled potatoes. Now the point I wish to make about this tale, which seems so weird and ridiculous, now that we *know* what causes diphtheria, is that the statistical reasoning in the paper cited is every bit as good and cogent as at least much of the statistical work in the field of public health in this country at the present time. We may be, and I fear too often actually are, making just as egregious spectacles of ourselves in our statistical discussions of tuberculosis, infant mortality, etc., as was the gentleman who proved (?) that potatoes cause diphtheria. I hope that the moral of this true story is plain."

Probably some infidel when he reads the following sentence in Professor Pearl's study of influenza—

"But the outstanding *single* factor, which apparently more than any other one thing yet discovered, determined how abruptly or explosively the mortality was to rise at the outbreak of the epidemic, was the normal death rate in the community from organic diseases of the heart"—

will mutter "potatoes"; indeed, the sentence is not happily worded, but Professor Pearl knows the difference between correlation and causation, and anyone who reads the whole of his papers on influenza should know it too.

The fourth part of the book deals with statistics of population, discussing and illustrating the use of the logistic curve, which was the topic of Mr. Udny Yule's recent address to the Royal Statistical Society.

The volume should be read, not merely by statisticians, but by all medical men, particularly by public health workers. Of course there are many points open to criticism; there are in any good book. But Professor Pearl writes so clearly and so temperately that in his most polemical moments he probably hurts fewer sensibilities than the average statistician wounds when he thinks he is being especially polite.

MODERN METHODS IN HEART DISEASE.

THE general practitioner must look askance at the appearance of any new book on heart disease, feeling that he will find in it a terminology which he cannot quite understand. In Dr. HEATHERLEY'S book on *Modern Methods in the Diagnosis and Treatment of Heart Disease*[6] he will find information supplied in a very practical manner, interspersed with crisp illustrations and without the aid of any graphic records. The author admits that he was brought up in the tenets of the old school and became converted to the new after twenty-five years of general practice, and the book has been specially prepared for the use of general practitioners. It is not a textbook on heart disease, but it is full of useful advice. The various abnormalities of the heart beat are discussed in a way that will rivet attention, while the chapters on heart failure and angina pectoris should prove very helpful. The closing chapters deal with symptoms and signs in general and with prognosis and treatment. The author puts in a plea for the general practitioner making use of his opportunities for original research, and points out that "neither a £300 electrocardiograph nor even a gilt stethoscope is required." There are very few points in which we would feel inclined to differ from the author, and none is sufficient to detract from the usefulness of the book as a whole. One can imagine the author's style gripping the reader, so that he will feel inclined to read steadily through the volume. The book has been specially dedicated to "those who find salvation in compensatory hypertrophy and who fear a well-conducted mitral."

This notice has been inadvertently delayed, and we understand that a second edition is now in the press.

[6] *Modern Methods in the Diagnosis and Treatment of Heart Disease.* By Francis Heatherley, M.B., B.S.Lond., F.R.C.S. London: Baillière, Tindall and Cox. 1923. (Demy 8vo, pp. x + 200. 5s. net.)

THE ADDER.

So few people nowadays have opportunities of meeting with the elusive denizens of our wild places that to many the title of this notice may suggest a machine in a city bank or other commercial office, rather than the true subject of Mr. NORMAN MORRISON'S monograph, which is at home on the sunny banks and rocky wilds of Great Britain. In *The Life-Story of the Adder*[7] he has put on record the results of many years' patient study and experiment, and has produced a work which, as Sir THOMAS OLIVER writes in a foreword, "will rank as a classic upon one of the sub-orders of vipera."

As a contributor to the press under the pseudonym of "Ophidia" Mr. Morrison has for years been known as an authority on British serpents. In this book he tells all that is known of the nature and habits of the *Vipera berus*, including some discoveries of his own. By actual experiment he has ascertained that frogs and toads are immune to adder venom, but that eels and presumably other fish are susceptible, for an eel which was bitten by one of his adders became paralysed and died in five and a half hours.

Some savages on certain ceremonial occasions devour their totem animal. It was not with any superstitious feeling of this sort, but in order to make his knowledge of his subject as complete and intimate as possible, that Mr. Morrison once dined on a boiled adder. He says that it was by no means disagreeable to the palate, that the flavour was between fish and flesh, and that the meal did not disagree with him.

It is well known that there are no indigenous snakes in Ireland, although two grass snakes were found in County Wicklow a few years ago. It is less well known, perhaps, that the island of Iona alone among the Scottish islands has no snakes, although they are common in the much larger island of Mull only one and a half miles off. Mr. Morrison does not attribute the immunity of Iona to the influence of St. Columba, but to its geological history. To test the *genius loci*, he took an adder from Mull and gave it a run (if such a word may be used of a snake) in Iona, which it seemed to enjoy, and it apparently felt no ill after-effects, although it was sent to Edinburgh packed in Iona grass. He also quotes Dr. Leighton as authority for the statement that an adder has been known to swim from Mull to Iona. Unfortunately this interesting would-be colonist died shortly after landing, its death being "probably due to heart failure," but it is obviously open to believers in the legend to attribute its decease to Columba's curse.

To the question whether adders swallow their young to protect them from danger Mr. Morrison can give no certain answer, for although one of his captives brought forth seven young vipers, they were prematurely born and she took no further notice of them.

Mr. Morrison fears that adders may become scarce in the West of Scotland. There seems no reason to think that this is the case in the South and West of England, for it is considered dangerous for children and dogs to wander in certain rocky places in Cornwall on account of the number of vipers. It might be a pity were they to become extinct in Britain, for their friends assert that they do more good by killing vermin than harm by occasionally biting

[7] *The Life-Story of the Adder.* By Norman Morrison, F.Z.S.Scot., Campbeltown. With foreword by Sir Thomas Oliver. Paisley: Alexander Gardner, Ltd.; London: Simpkin, Marshall, Hamilton, Kent and Co., Ltd. 1924. (Cr. 8vo, pp. 133· 14 figures. 6s. net.)

a dog or human being. Mr. Morrison found a full-grown rat in the stomach of an adder; such a large animal could hardly be captured by the non-poisonous grass-snake, yet the adder, though smaller, is able to do so, thanks to its deadly venom, which owes its power to its haemolytic property. Mr. Morrison suggests that this property might make adder venom of value in the treatment of cancer, but it is not to be expected that its action could be restricted to cancer cells only.

The adder is untameable and when in captivity invariably starts a hunger strike and dies of starvation. Even when she (four-fifths of the adders found are females) is forcibly fed she refuses to digest the food and dies just as soon and as surely.

Lord Avebury believed that he had won the affections of a she-wasp and described in moving words her dying farewell to him. Mr. Norman Morrison is under no delusion as to the possibility of making a friend of an adder, but he evidently has a very soft spot in his heart for these "charming creatures," as he calls them, and his enthusiasm for his subject much enhances the interest and value of his book.

APPENDICITIS AND ALLIED CONDITIONS.

THE importance of the early recognition of acute appendicitis and the necessity for prompt surgical intervention are now universally recognized. Dr. GUILLAUME does not challenge the wisdom of this; but in his book, *Les Colotyphlites*,[8] he contends that appendicitis has assumed too prominent a place in the diagnosis of abdominal trouble, especially of chronic abdominal trouble, of which he considers the appendix is often unfairly held to be the cause. The work is dedicated to the memory of Professor G. Dieulafoy, whose views the author shares, and to whose clinical sagacity and diagnostic acumen the author, in his introduction, pays a striking tribute.

The history of the progress of our knowledge of abdominal diagnosis is reviewed. Before the days of the widespread recognition of appendicitis, perityphlitis held the diagnostic field; and now, in the author's opinion, the pendulum has swung too far in the other direction, and many conditions are labelled appendicitis whose real nature is an infection, not really of the appendix, but of adjacent parts of the intestinal canal. Pain in the right iliac fossa is the almost constant feature of these disorders, and a considerable part of the book is devoted to a careful investigation of the significance of this syndrome. Dr. Guillaume urges his readers to investigate the part played in the production of these phenomena by a variety of affections and so to arrive at a proper understanding of the real nature of each and the appropriate treatment.

The book is divided into fifteen chapters, followed by an epitome of the author's conclusions. The bibliography is extensive, containing more than a thousand references. Drawing on a wealth of anatomical and physiological facts, Dr. Guillaume studies the various problems presented; these include the factors tending to produce appendicular mischief, the relation of appendicitis to other morbid conditions affecting the intestines, and the problems presented by chronic appendicular trouble and the signs pointing to its presence. Abnormalities, both of the structure and the position of the ascending colon, are discussed, as also the unduly mobile caecum and its relation to chronic intestinal stasis.

Dr. Guillaume is careful to define the terms he uses to designate such conditions as typhlocolitis and colotyphlitis. Typhlocolitis is the condition found in those false appendicitis cases of intestinal origin so named by Dieulafoy. Under the heading of colotyphlitis numerous affections of the intestinal tract are brought together and analysed; they are then considered synthetically and their relationship with the signs and symptoms referable to the right iliac fossa described.

The author is to be congratulated on having written so interesting and challenging a book. The problems that have engaged his attention are of wide interest, and his contribution to the subject undoubtedly throws much light on the etiology, diagnosis, and treatment of those chronic abdominal troubles whose features resemble appendicitis so closely.

[8] *Les Colotyphlites et le syndrome de la fosse iliaque droite (appendicites, pericolites, colotyphlites).* Par le Dr. A. C. Guillaume. Paris: Gaston Doin. 1924. (Roy. 8vo, pp. xx + 386. Fr. 35.)

A MEDICAL MISSIONARY'S REMINISCENCES.

THERE must be few men in this or any other country who are university graduates alike in arts, medicine, divinity, and law, as is J. E. Hine, Bishop Suffragan of Grantham, and formerly Bishop successively of Likoma, Zanzibar, and Northern Rhodesia. That a man with these qualifications should have devoted many years of his working life to missionary service for the Church of England in Central Africa is an arresting fact, and now, under the title of *Days Gone By*,[9] Bishop HINE has written his autobiography. The story embraces his medical training at University College, with notes on his teachers and contemporaries; also his life at Oxford in the days of Burdon-Sanderson, including the scene in the Sheldonian, when the proposal to establish a physiological laboratory was carried after a keen discussion, which centred in the introduction of experiments on living animals. The author tells how Burdon-Sanderson developed a serious illness, and insisted on the future bishop attending him, a task by no means easy, as the patient looked on himself in the light of an experiment, and subjected the experimenter to a perpetual viva voce examination in all the symptoms and every step in the treatment.

But the great bulk of Bishop Hine's fine volume consists of a detailed account of his labours in Central Africa after taking holy orders. His dispensary and surgical work is only incidentally mentioned, his heart and soul being wrapped up in the establishment of Christianity. Central Africa, he urges, can never be a white man's country; while malaria and sleeping sickness may be done away with, the tropical sun remains, and it is of great importance to the welfare of the world that, in addition to teaching the native races to till their land, rule by law, and exercise justice, they should be brought under the strengthening discipline of the Christian faith. To that end Bishop Hine has devoted himself throughout a life spent in the midst of the discomforts and dangers and diseases belonging to such a country. Now he is back again in his own land, still engaged in his congenial work, but yet finding leisure to write this interesting autobiography.

[9] *Days Gone By: Being some Account of Past Years, chiefly in Central Africa.* By J. E. Hine, M.A.Oxon., M.D.Lond., Hon. D.D.Oxon., Hon. D.C.L.Durham, M.R.C.S. London: John Murray. 1924. (Demy 8vo, pp. xii + 313; 16 plates, 1 map. 16s. net.)

NOTES ON BOOKS.

A REPORT of the eleventh Congress of Medicine of the Northern Countries, held at Christiania,[10] has lately been published by Dr. OLAF SCHEEL as a supplement to the *Acta Medica Scandinavica*. Professor P. F. Holst, in his preliminary address to the congress, recalled that in the previous congress held twenty-five years ago at Christiania the main subject of discussion was organotherapy. On the present occasion endocrinology was considered in detail, and the great advance in knowledge during the twenty-five years between the congresses was apparent. The report contains two addresses—one on the treatment of thyroid diseases, by I. Holmgren, and another on metabolic conditions of thyroid origin, by H. C. Hagedorn. Besides these addresses fifty contributions are included in the report, each being in the language used by the author; in several cases the discussions following the papers are also briefly reported.

In his *Elementary Morphology and Physiology*[11] Mr. WOODGER, reader in biology, University of London, has attempted to meet the special needs of a student who has later to go on to anatomy and physiology by giving him a comprehensive survey of the form and activities of living beings. He presupposes laboratory work, and has very little to say about plant morphology or physiology; hence the word "animal" should have appeared in the title. Not only is Mr. Woodger's survey broad, but it is philosophical; throughout the description of the driest morphological details there runs the conception of the necessity for interpretation. Particularly

[10] *Rapports et Comptes Rendus du Onzième Congrès de Médecine des Pays du Nord Tenu à Kristiania du 3 au 5 Juillet, 1925.* Publiés par le Dr. Olaf Scheel. *Acta Medica Scandinavica*, Supplementum VII. (Med. 8vo, pp. 376; illustrated.)

[11] *Elementary Morphology and Physiology for Medical Students.* By J. H. Woodger, B.Sc. London: Humphrey Milford, Oxford University Press. 1924. (Demy 8vo, pp. xx + 528; 255 figures. 12s. 6d. net.)

valuable is the way in which the facts of embryology are introduced, for this branch of biology can be made dull beyond all imagining. The way in which the large subjects of evolution, heredity, and variation, with their subtopics of the germ-plasm and Mendelism, are handled shows that the author has a power of discriminating between facts and surmises. Some even of the arid facts of histology are illuminated by interesting speculation, as when it is suggested that membrane-bone is more "primitive" than bone formed in cartilage. As the scope of the work is so wide, Mr. Woodger could not logically avoid discussing the controversial evergreens of biology—the relations of mind to matter, interactionism and parallelism, mechanism and vitalism, and animal behaviour in general. He has succeeded in making them the most arresting parts of his treatise. When describing the mode of attachment of the ovum to the uterine mucosa some reference should have been made to the recent important monograph by Professor J. H. Teacher of Glasgow University. The statement (p. 13) that weight for weight fats yield less energy than carbohydrates is not in harmony with the careful pronouncements which elsewhere characterize this book; they really yield more than twice as much. The many illustrations are generally excellent, a large number of them being original.

The fifth edition of Mracek's atlas of skin diseases[12] has been brought up to date by Dr. PAUL MULZER of Munich, who has succeeded Dr. A. Jesionek in the editorship of this well known manual. The principal change in the present edition consists in the replacement of some of the previous illustrations by better plates, some of which have been taken from Stein-Henning's book, and others from Professor Hoffmann's collection of wax models at Bonn.

The trial of Frederick Bywaters and Edith Thompson for the murder of Percy Thompson took place so recently that there is no need to dwell much on the circumstances which are recorded with such full detail in the volume which Mr. FILSON YOUNG has edited for *Notable British Trials*.[13] Bywaters was a waiter or a laundry steward on a P. and O. steamer, 20 years of age. Mrs. Thompson was a bookkeeper and manageress to a wholesale milliner, aged 28, who lived on rather bad terms with her husband Percy in a house he had bought at Ilford. She appears to have committed adultery with Bywaters some time before the murder. Bywaters brutally stabbed Thomson to death in his wife's presence. They were both found guilty, sentenced to death, and hanged. Such are the bare facts. Neither of them showed much intelligence or forethought in planning the crime, and their subsequent behaviour and contradictory statements made the task of the prosecution easy. The case was entirely devoid of interest from a medical point of view. It is true that the female criminal probably made several unsuccessful attempts to murder her husband by administering broken glass and other substances, but no medico-legal problems were presented. Mr. Young, who is a well known journalist, uses all his skill in an attempt to invest this sordid case with a romantic interest and to make an unfortunate if injudicious heroine of the woman. We are more inclined to agree with the judge that the letters were "gush" than to subscribe to Mr. Young's hyperbolical statement that they form "a series of the most remarkable letters that have ever been made public in modern times." Except for the frequent allusions to what were clearly attempts at murder, the letters appear to us to be of slight interest. The callous way in which these attempts seem to have been discussed, the levity with which the crime of murder was regarded, and the brutality of the final climax must shock all serious minded persons, the more so as it was not necessary to the realization of their guilty hopes of free indulgence of their passions.

[12] *Mracek-Jesionek Atlas und Grundriss der Hautkrankheiten.* Edited by Dr. Paul Mulzer. Fifth edition. Munich: J. F. Lehmann. 1924. (Cr. 4to, pp. viii + 260; 52 coloured plates, 85 figures. £1 4s.)

[13] *Trial of Frederick Bywaters and Edith Thompson.* Edited by Filson Young. Notable British Trials Series. Edinburgh and London: William Hodge and Co., Ltd. (Demy 8vo, pp. xxxii + 261; 9 plates. 10s. 6d. net.)

PREPARATIONS AND APPLIANCES.

Antiseptic Surgical Spirit.

THE difficulty in obtaining alcohol in a pure state is a cause of no less trouble to the many who use it otherwise than as a beverage than to that section of the population who only know it as a constituent of drink. The only form of duty-free alcohol recently available for surgical and nursing uses was one which had been rendered comparatively undrinkable by the addition of naphtha. Methylated spirit was serviceable for those purposes until lately, when the Board of Customs and Excise adopted the course of adding to it crude pyridine in order to render it wholly undrinkable. Such spirit cannot be applied to the skin owing to the toxic activity of the pyridine.[1] It is creditable to the enterprise of certain firms of manufacturing druggists that they have sought, with the Board of Customs and Excise, for a relief from the difficulty. The Board has granted permission for the supply of a spirit for surgical use which has been denatured in accordance with an approved formula containing no pyridine. Messrs. Duncan, Flockhart and Co. of Edinburgh, and the British Drug Houses, Ltd., of London, have each undertaken to supply non-pyridinized methylated spirit. We have examined analytically samples of the spirit supplied by these firms. They are free from pyridine, and appear to be perfectly satisfactory for all the uses of methylated spirit. They become milky on dilution with water, and there appears to be no escape from that objection. The different spirits are rendered antiseptic each in accordance with the maker's formula.

[1] See BRITISH MEDICAL JOURNAL, December 27th, 1924, p. 1207.

Curved Surgical Needles.

Mr. C. A. STIDSTON, honorary surgeon, Wolverhampton and Staffordshire General Hospital, writes: The needles shown in the accompanying sketch may be of interest. The chord from eye to point is 3½ inches, the arc 6 inches. The section is that of the average large needle. They are made (*a*) in flat cross-section with cutting points, and (*b*) rounded in section and point for peritoneum. In closing the abdomen, perineum, etc., they possess the advantage of saving time by dispensing with the use of a needle-holder, yet giving a clear field when finger-held. They compel alertness in an assistant. They require long sutures. The needles are made by Messrs. Charles Spencer of Redditch, and are sold by all instrument manufacturers.

NEEDS OF SCOTTISH HOSPITALS.

(*Continued from page 281.*)

THE Committee appointed by the Scottish Board of Health to inquire into the inadequacy of the hospital services in Scotland completed its sittings last week. The Committee again met on February 2nd under the chairmanship of Lord MACKENZIE. The witnesses examined on that day included Sir Robert Philip, LL.D., Sir Harold Stiles, F.R.C.S., and Dr. J. S. Fraser.

Sir ROBERT PHILIP said he was satisfied that present conditions did not meet the demand, but the amount of inadequacy varied in different parts of the country. Among other things there was insufficient accommodation for cases of non-pulmonary tuberculosis, although he considered that the local health authorities, for the most part, were doing their best to make provision. He attributed the growing demand for hospital accommodation to a greater attention to preventive medicine, to the development of research in medicine, and also, it seemed to him, that the humour of the age was to enter institutions. There was no doubt that the standard of professional attainment was much better in this country than it used to be, and therefore much of what was regarded as calling for hospital treatment in the past might now be dealt with in the home. He thought that home nursing facilities might be extended with much advantage, and he thought that a system whereby nurses went from the hospital to patients might prove of great advantage. Cottage hospitals throughout the country would seem a natural form of relief, but there was need for more formal co-ordination between different institutions. Patients should be encouraged more than they were at present to pay for their own maintenance; and it seemed to him absurd that patients, who merely required surgical relief, should have their maintenance paid while they were in hospital. If this aspect were presented more definitely to patients at the commencement of their stay in hospital, a large number would probably refuse to accept free maintenance. It seemed to him that State grants might be made, not merely in times of emergency, but for erection and definite extension. It would certainly be fair to call upon the State to recognize the claims of the teaching hospitals, whatever the State might be disposed to do in regard to other hospitals. In reply to a question, Sir Robert Philip said that in any district where it was proved there had been a failure to provide adequate hospital accommodation, the local authority ought to step in both in regard to this and in regard to nursing services.

Sir HAROLD STILES indicated how he would propose to make the advantages of the Royal Infirmary of Edinburgh available in the surrounding districts. He thought that the secondary hospitals were capable of doing more work than they had hitherto done, and thus relieve pressure on the infirmary, provided that they were efficiently staffed. Many of these hospitals should be enlarged; and, in so far as surgery was concerned, the work should be undertaken by men who were pure surgeons and not general practitioners. He thought the minimum working size for such a hospital was 100 beds. Cottage hospitals should also be linked up with the larger hospitals. As to paying patients, he favoured separate blocks with a separate operating theatre and separate administration. He approved of the principle of subsidizing surgeons in certain places, if not in the teaching hospitals. He also saw no objection to the State meeting the needs of hospitals, and did not think that this would have the effect of checking voluntary support. If the enlargement of secondary hospitals, or, for example, the Edinburgh Infirmary, were necessary, it would be the primary affair of the State to provide the capital while the public supplied the money to run the institution, and if the State

provided the capital sum it would actually be an inducement to the public to contribute.

Dr. J. S. FRASER, surgeon in charge of the ear, nose, and throat department of Edinburgh Royal Infirmary, speaking from a précis which he had submitted to the Committee, said that something would be lost if the voluntary system were to go. The medical profession generally, he believed, was still against nationalization of hospitals. He believed, however, that the advantages of rate and State aid would far outweigh the disadvantages. He did not think that service could be given efficiently under the present system, although it was very pleasant to work under. The present system could be kept going from year to year, but it could not be extended. With regard to the Royal Infirmary of Edinburgh, he advocated a considerable extension of ground and property, and suggested that a large nursing home in the immediate neighbourhood should be acquired to form the nucleus of a nursing home annexe which would be a wing for paying patients. He considered that a "follow-up system" was required to ascertain progress of patients after leaving hospital. Contrasting Scotland with America, he said that 80 per cent. of the population in this country came to the voluntary hospitals for surgical treatment, while the consultants were supported only by the remaining 20 per cent. In America the proportions were almost exactly reversed.

On February 3rd evidence was given by Dr. William Robertson, D.P.H., F.R.C.P., medical officer of health for Edinburgh, on a précis of evidence which he had already presented to the Committee. He dealt mainly with hospital provision from the preventive side, and thought that the present provision of hospitals for the isolation of infectious diseases was ample.

Dr. ROBERTSON said that the provision for infectious diseases differed in different areas. The generally accepted rate was one bed for every 1,000 of the population, which might be satisfactory in rural areas, but should be increased for cities to one bed for every 800 of the population. The medical inspection of school children, which it had been hoped might aid in stamping out infectious diseases, had not in experience borne out this hope. He was satisfied that the aim of present-day public health along the lines of producing artificial immunity among the younger population would give good results; and the reduction of disease would lessen the demands on infectious diseases hospitals. He thought that in future the demands on isolation hospitals would be less pressing than they were now. This pressure would be further relieved when the population of the larger centres were housed under better conditions than they were at present. This witness said he hoped that the pasteurization of milk and the possibility that now existed of putting on the market pasteurized milk at the same price as ordinary milk would have a considerable effect in diminishing diphtheria, scarlet fever, and tuberculosis. He thought there was a need for supplementary wards where, after having passed through the acute stage of measles and whooping-cough, patients might pass a period of convalescence and have fresh air treatment. These supplementary wards need not be of elaborate or substantial structure. At present during acute epidemics of these two infections the shortage of accommodation compelled them to discharge patients immediately after they had recovered from the acute stage. Another principle that might reasonably be considered was the setting aside of special wards for the treatment of scarlet fever and diphtheria where paying cases might be treated. With regard to the subject of tuberculosis, he held that the provision of institutions for this disease was unequal; and that the accommodation for advanced cases was insufficient, and patients often had to be sent out to a very unsatisfactory home in order to make room for other cases. Dissemination of tuberculosis could be actually traced when advanced cases were allowed to live and die in small houses. With regard to venereal diseases, Dr. Robertson expressed the opinion that there was not enough hospital accommodation. Much more preventive work could be carried out if additional beds were provided for the proper treatment of children affected by the disease. With regard to venereal disease the public health committee in Edinburgh was fully convinced that compulsory notification was the right policy. He thought that there were no insuperable difficulties in regard to co-operation between the voluntary, public health, and Poor Law hospitals, given good will on all sides.

Dr. J. H. MEIKLE, medical officer to the Edinburgh education authority, in giving evidence said that in Edinburgh they had two school clinics. So far as eye diseases were concerned, there was no co-operation between the education authority and the Royal Infirmary. The authority had no opportunities for operative treatment of tonsils and adenoids, and these cases went to the Royal Infirmary and elsewhere. He believed that if the education authority undertook this treatment a small hospital with beds would be necessary. In 1912 the education authority had made an agreement with the Royal Infirmary whereby the authority contributed a certain amount to get *x*-ray treatment done in that institution for ringworm, and this arrangement had been very successful.

Major G. STEVENSON, M.D., Glasgow, member of the Massage Board of Scotland, gave evidence in regard to the proper organization of this type of work, and said it might be possible to save beds in general hospitals and to shorten the period of incapacity after injury and prevent much chronic invalidism and crippling by this means. The position regarding massage training in Scotland at present was that there was only one school, situated in the Western Infirmary, Glasgow. Speaking generally, the numbers of workers trained in massage in other hospitals were hopelessly inadequate to cope with the numbers of patients requiring this treatment. The present tendency all over the country was towards a radical change as regarded the position of massage departments of hospitals. Many patients were sent to hospital for the sole purpose of receiving treatment by massage. This affected both surgical and medical cases and both out-patients and in-patients. It was suggested that massage and medical electricity should be put at the disposal of any insured patients requiring it, and that more might be done in the way of forming local treatment centres in industrial areas. With regard to the group of children's cases, there was a possibility of group treatment; that is to say, that children suffering from similar conditions might be treated together in welfare centres and afterwards at school by methods such as re-education of muscles and artificial sunlight. As regarded the group of chronic invalids, many would be best treated in their own homes, and there might be a district masseuse service on the lines of the district nurse service. He thought it would be profitable also to have centres in mining districts where massage treatment could be obtained.

On February 4th the Committee examined Dr. Alexander Shearer, who is medical officer of the Scottish Board of Health, with regard to the medical service of the Highlands and Islands.

Dr. SHEARER explained that a sum of £42,000 was voted annually by Parliament and paid to the Highlands and Islands Medical Service Fund for the general purpose of providing forms of skilled assistance auxiliary to general medical service. The general idea was to bring medical attendance within the reach of crofters and dependants of insured persons at fees which they could reasonably be expected to pay, despite the great distance of their residences from the nearest doctor. Close co-operation between authorities and voluntary agencies, such as district nursing associations and hospitals, was clearly contemplated. During the year 1924 grants had been paid to 64 nursing organizations, the number of hospitals assisted had been 6, and the number of ambulance committees 3. Towards the end of the year payments had been made for the first time towards the maintenance of resident surgeons in the islands of Shetland and Lewis. The witness said that, in addition to 155 nurses whose maintenance was assisted from the fund, a number of nurses were also supported by private persons. He thought that an addition of between thirty and forty nurses to the existing staff was required, as well as a more general provision of motor conveyances for the nurses. By the provision of motor-cycles two nurses might be able to cover an area for which three were at present necessary. The annual cost of a nurse, including salary, was between £180 and £200. This witness said that the number of beds available in the 22 hospitals of the Highlands and Islands might be taken as 340, and he thought this amount of general hospital accommodation was reasonably adequate, although he believed that some medical cases at present treated at home would be sent to hospital if they were certain that accommodation would always be available. He thought that by a service of specialists in cottage hospitals the flow of cases to the south would be stemmed to some extent. In certain remote localities there was a strong case for the provision of some form of hospice, which could conveniently take the form of a nurse's house having accommodation available for the reception of emergency cases. The sites at which these hospices should be erected would have to be the subject of special survey in regard to nursing needs, means of communication, etc. In regard to additional services, he thought that the services of medical consultants might be made available, and in the matter of surgery the need for specialist assistance was more urgent and would be heartily welcomed. An addition to the annual grant in aid would be required if progress in these matters was to be maintained. The witness agreed that it might in some instances be better to spend money on main roads so as to facilitate transport than to spend it on building new hospitals.

Mr. JAMES HAY, an Aberdeen advocate, gave evidence supplementary to statements which had already been made in regard to the Royal Infirmary of Aberdeen. This infirmary, he stated, had 309 beds, and a deficit on the working for last year of £749, as well as improvements on the *x*-ray department, etc., amounting to £2,449, had been met from legacies. He considered that the voluntary system had risen to the requirements of the North of Scotland in a wonderful way. Although the expenditure of the infirmary had increased enormously in recent years, income had kept pace with the increase. Amongst the sources of income were contributions from insurance and friendly societies, which last year amounted to £1,402. The directors of the institution thought that 400 beds would be ample accommodation in Aberdeen for many years to come. The witness was of opinion that the amounts of £360,000 capital outlay and additional revenue of £30,000 previously mentioned to the Committee by another witness as necessary for the joint hospital scheme in Aberdeen were greatly exaggerated. He suggested, however, as sources from which additional revenue might be got, the health insurance societies, a grant for surgical tuberculosis, and a Treasury grant under conditions similar to those given to universities. In the case of grants he would postulate no interference from the outside. The Chairman remarked that the information seemed to show that, although there was a shortage in Aberdeen itself, there appeared to be a surplus of accommodation in other places; and he asked whether by co-operation with other hospitals beds could not be cleared with greater rapidity. The answer was that that had not been considered. Witness did not know that there were any hospitals with vacant beds.

At the conclusion of the evidence submitted on February 4th the Committee sat privately to consider what additional measures should be taken by it to further its object.

The Committee then adjourned *sine die*.

Nova et Vetera.

DUELLING IN INDIA.

IT is a curious fact that in an age when duelling prevailed no officer in the Indian Medical Service was ever killed in a duel, though at least six cases are on record in which officers of that service killed their antagonists in duels. In three of these cases the survivor was tried for murder in one or other of the Indian High Courts, and, almost as a matter of course, acquitted; in one case tried by court martial the accused was cashiered, but the penalty was subsequently remitted. In two cases, in both of which the duel was fought on foreign territory, no proceedings seem to have followed. In one case it is not stated what weapons were used; in the other five pistols were the arms selected. Duelling was common in India for about a century, and duels without a fatal result attracted little attention and were not recorded. The practice gradually died out before the Mutiny.

The earliest case recorded of a fatal duel, in which an Indian medical officer was concerned as principal, took place in 1777; the papers relating to the case are preserved in the Calcutta Record Office. Captain W. Crabb, officer commanding at Monghir, reported to Government, in a letter dated June 4th, 1777, that Surgeon James Ford had shot Lieutenant Sydney Smith in a duel. Ford was sent to Calcutta to stand his trial for murder in the Supreme Court. Procedure was slow. On December 4th, 1777, six months later, Robert Jarrett, the Company's attorney, was ordered to conduct Ford's prosecution. On December 27th Jarrett reported that Ford had been honourably acquitted. Ford had entered the Company's service in 1766, rose to be surgeon-major of a brigade in 1781, and died at Barhampur on April 6th, 1783. He served in the Rohilla war of 1774, and in the first Maratha war in 1781, as senior surgeon to Colonel Carnac's force.

The next case occurred some three years later, in or about 1780, and is mentioned in *Memoirs of William Hickey* (vol. i, p. 319). Surgeon Kenneth Murchison fought a duel with a Captain Crofts, at Lucknow, and shot Crofts dead. No proceedings seem to have been taken in this case. Lucknow was then the capital of the Kingdom of Oudh, independent territory. Murchison was an officer in the Bengal Army, but his services had been lent to the King of Oudh. Crofts had borne a commission in the British Army, but had resigned it, and was in the service of the King of Oudh, not in that of the Company. Probably the Government of India never heard of the case, officially; if they did, they would consider it no business of theirs. Murchison entered the Company's army in 1776, spent most of his service in Oudh, went home on furlough in January, 1784, did not rejoin, and was struck off from that date. He died at Bathampton in 1796. He was the father of Sir Roderick Murchison, the great geologist.

The *Calcutta Gazette*, which was then a newspaper, publishing general news as well as the official gazettes, in its issues of March 26th and April 30th, 1789, mentions that a duel had been fought at Pondicherry between Mr. W——y, of the Madras Civil Service, and Surgeon R——, of Madras, in which the former was shot through the head and the latter had his leg fractured. Mr. W——y was James Woolley, a civilian of high rank in the Madras Civil Service. It is not possible to identify Surgeon R——, for there were in 1789 no fewer than five officers of the Madras Medical Service of the rank of surgeon whose names began with R; among them was William Roxburgh the botanist; further, the official naturalist, Surgeon Patrick Russell, who resigned in February, 1789, may still have been in Madras in April. No criminal proceedings were taken, the duel having been fought on French territory. Evidently the two combatants had gone over the border to Pondicherry to fight the duel, as Englishmen used to go to Boulogne for the same purpose, after duelling had been stopped in England.

Surgeon William Betty, of the Madras Service, was tried by court martial and cashiered on October 6th, 1803, for having killed, on September 7th, 1802, Lieut.-Colonel Sir Robert Hamilton, of the Bengal Army, in a duel at Amboyna, a small island in the Malay Archipelago, where they were present on military duty. Why Betty was tried by court martial, instead of being sent for trial by the Supreme Court, is not quite clear, but Amboyna was not British territory; it was therefore not within the jurisdiction of the Indian courts, and both Hamilton and Betty were there on military duty. Exactly the same facts, both as to duty and locality, apply, however, to the next case, which was tried in Calcutta. The order of court, quoted below, suggests that the court martial was rather for other breaches of military duty than for the duel itself. Two years later Betty was restored to the service by the Court of Directors, by an order dated April 18th, 1805, in which they state:

> "We have been influenced in our decision upon Mr. Betty's case by the peculiar circumstances of his long arrest previous to his trial, and of his having been acquitted of all the charges brought against him, except that of breaking his arrest, in which he appears to have acted more from an error in judgment than intentional disobedience, and likewise by the very strong and unanimous recommendation of the court martial in his favour."

From this order it seems that Betty must have been acquitted of the more serious charges and convicted only of a more or less technical offence. Presumably Hamilton was the aggressor and challenger.

Assistant Surgeon Walter Key, of the Bombay Service, medical officer of the Company's cruiser *Malabar*, was tried in the Calcutta Supreme Court on January 13th, 1815, for having killed Lieutenant Passmore of the same vessel, in a duel fought on February 22nd, 1814, on the island of Bouro, one of the Moluccas. Lieutenant Edward Searight, who was first lieutenant of the *Malabar* at the time of the duel, but had succeeded to the command before the trial, was also indicted, having been Passmore's second. Lieutenant Irwin, who seconded Key, was not brought to trial. The chief evidence was that of Searight, who stated that Passmore had been the aggressor. Both prisoners were acquitted. Key was ill at the time of the trial, and died a few days later.

The sixth and last case is also the most interesting. On July 18th, 1835, Assistant Surgeon John Porter Malcolmson, of the Bombay Service, in a duel at Poona, shot and killed Captain Alexander Urquhart, of the Bombay Cavalry. Mrs. Malcolmson appears to have been the cause of the duel. *Nulla fere causa est, in qua non femina litem moverit.* This is the only one of the six cases in which any suggestion as to the cause of the duel has survived. Malcolmson was wounded in the hand, and got tetanus but recovered. After the duel Assistant Surgeon James Don was called to attend him. On September 25th, 1835, the survivor, Malcolmson, the two seconds, Captain Foster Stalken and Lieutenant James MacDonnell, and Don, were tried for murder in the Bombay Supreme Court, before the Chief Justice, Sir Herbert Compton, and Sir John Awdry, puisne judge. The prisoners made no defence. When Sir John Awdry began to deliver the charge to the jury, the foreman stated that the jury had made up their minds to acquit all the prisoners. The judges accepted this verdict, Awdry remarking that Don, who had not been present at the duel, but was called in after it was over, should not have been put on trial. Malcolmson had joined the army in 1826, and died at Nasirabad on June 16th, 1854. He served at the capture of Aden in 1840, and in the Punjab war in 1848-49, when he was present at the siege and capture of Multan and at the battle of Gujrat. Don took the L.R.C.P.Lond. in 1824, and was the first officer to enter the I.M.S. with this qualification. He joined in 1825, became a member of the Medical Board in 1855, retired in 1857, and died at Brechin on July 18th, 1864. He served in the first Afghan war in 1839.

British Medical Journal.

SATURDAY, FEBRUARY 14TH, 1925.

THE POSITION OF PATHOLOGY.

IN an article published on January 31st (p. 225) we gave some account of the quinquennial review contained in the report of the Medical Research Council for 1924, but omitted reference to certain important paragraphs relating to pathology and bacteriology. It is observed in the report that "The position and progress of these sciences, on which so much of the current work of medicine depends, cannot be regarded as satisfactory." This statement comes rather as a surprise after reading of the healthy condition of the sciences of physiology, biochemistry, and of experimental and clinical medicine. We took some natural pride in the achievements of the faithful stewards who have multiplied their talents, but must turn now to those from whom less has been received than was expected.

It should be said at once that the report criticizes the subjects of pathology and bacteriology only from the point of view of organization, but other critics have suggested that these sciences are now "sterile," and that further exploration is unlikely to lead to any new discoveries of value to medicine. The report does not take that attitude, and scattered throughout its pages is to be found abundant evidence that the sciences of pathology and bacteriology are attracting extremely able research workers from whose studies much is anticipated. Undoubtedly we have passed beyond the era of periodic sensational discoveries of microbes; we have reached, perhaps, the time for firm consolidation of territory won by brilliant and almost too rapid advance. Bacteriology is exemplifying the law of diminishing returns, but is far from being "played out." If it has come upon evil days it is not because of exhaustion of its vitality, but because of harmful external influences such as those which this report indicts with severity.

After tracing the historical development of the sciences of pathology and bacteriology, the report points out that "the practical value of bacteriology in the public health services and in medical diagnosis became obvious and the need for it became increasingly urgent at a time when in many places the university professor and his department were the only source of supply. At the same time the universities, all poorly endowed, were actually unable to equip these new subjects without exploiting this economic value of bacteriology and using the fees earned by the professor to support him and his department." Thus it happened that practically all the departments of bacteriology, in the English universities at least, have been developed as commercial laboratories. Similar evils have existed in the big hospitals, where full advantage has not been taken of the unique opportunities for original investigations which exist because the pathologist has been commonly so poorly paid that he has found it necessary, and indeed has been expected, "to augment his salary by making paid routine examinations for his colleagues in practice or by taking the remunerative path of vaccine therapy."

The Medical Research Council's report deplores the fact that during the past five years little improvement in the general situation has taken place. In former days, when the laboratories of the universities were performing a task which could not have been done adequately elsewhere, it was possible to offer some defence for this commercial system, but those days have passed, since a sufficient number of competent bacteriologists could be found outside the ranks of university teachers for the work required by local authorities and private practitioners. How their work might be organized and their status upheld has been very ably indicated in what is commonly known as the Dawson Report.[1] That report suggested that at certain primary centres there should be laboratories, of which the first and essential function would be the provision of facilities for general practitioners to make such examinations as they could and wished to do. Assuming such help in recording results as is elsewhere indicated through secondary centres, university centres, and the Medical Research Council, the result of this organized union of clinical observation and pathological research would be, it was believed, to make large additions to our knowledge, especially of the early stages of disease. The stereoscopic view produced by the combination of the visual fields of clinician and pathologist brings often into relief essential factors in a case which would otherwise escape observation. Experimental work may not infrequently be sterilized if divorced from clinical work, the problems being tackled *in vitro* rather than *in vivo*. Although specialism remains necessary in the more recondite parts of the subject, yet the giving back of pathology in part to the general practitioner would result in a triple line of advance. Research pathologists in university centres and elsewhere would be supplied with more material, thanks to the increased number of collectors working for them in wider fields; general practitioners would handle personally a most valuable weapon in diagnosis; and, thirdly, provision would be made for collecting, collating, and publishing that knowledge which at present too often dies with the individual.

Another problem of very great importance presents itself in this connexion. The setting free of the universities and other research laboratories from the drudgery of routine work implies an increasing infliction of this necessary, but often soul-destroying, labour upon a group in the profession for whom no prospects of anything higher are at present discernible. These routine workers, engaged in the same dreary round of simple investigations year after year, find their intellectual outlook cramped, and inevitably become mechanical in their work. Without prospects of promotion to more advantageous positions or to appointments conferring facilities for original investigations, their services are lost to scientific research. It is neither good nor necessary for pathological and bacteriological work to be penalized in this way. The problem is to a certain extent considered in the Dawson Report, in which it is suggested that those who work at the primary laboratory centres might spend occasional periods at the laboratories of the secondary centres for the improvement of their skill and knowledge. It is further hinted that the secondary centre laboratories should be linked up with the chief, or university, centres, which would deal with problems of exceptional difficulty, or investigations involving very special or expensive inquiry. Something more than this is necessary, however—namely, the possibility of the specialist workers passing from one grade to a higher in accordance with their increasing

[1] Consultative Council on Medical and Allied Services. Interim Report on the Future Provision of Medical and Allied Services. 1920. London: H.M. Stationery Office. Cmd. 693. Price 1s. net. See Section VI (a), pp. 18-20.

knowledge and ability. This would be attained by the creation of a graded service, comparable with other national services, in which promotion would be the reward of ability. Junior members of such a service would receive a thorough training in technique, and would be encouraged to use their talents rather than neglect them, as is the inevitable result at present under the daily pressure of performing simple investigations which soon become mechanical. As they became expert their services would be made available in more advanced researches: proved ability would bring with it escape from routine and the provision of increased opportunities for original work. This would produce a number of trained investigators who would interest themselves in the many problems of which the solution is at present delayed.

The report of the Medical Research Council points out that further assistance in the advance of pathology may be legitimately expected from the universities and medical schools. Unfortunately, many universities are still reluctant or unable to relieve their staff from the monotony of routine examinations, for their departments have been built up on a basis of commercial work, and so the financial difficulties in the way of reform appear almost insuperable. At Oxford and Cambridge, however, the schools of pathology have now been relieved of such commercial work, and rewards have come in the shape of generous benefactions. Thus, at Oxford the Dunn Trustees, and at Cambridge the Rockefeller Foundation and Mr. Ernest Gates, have provided large sums for the erection and equipping of new buildings for pathological studies. As the result of this a strong forward movement may be confidently expected at these two universities, and it may be noted in passing that pathology has already been included amongst the subjects for the advanced honours course in natural science at Cambridge, where also college fellowships have been given for the subject. As Lord Curzon points out in the report, the community at large will be well served by an increase in the number of those enabled to lead the active intellectual life of research and higher teaching, thus opening the only certain channel for rapid gains even from the utilitarian standpoint.

PERPENDICULAR HOUSING.

A PROBLEM, suddenly acute in Birmingham, and casting its shadows before in London, has arisen out of proposals in both cities to undertake slum clearance schemes by the provision of large blocks of workmen's flats in central districts. The thorny aspects of the Birmingham problem revealed themselves at a recent meeting of the City Council, when a noisy and acrimonious discussion was provoked by the announcement of a programme for the demolition of a slum area and the replacement of back-to-back houses and other insanitary dwellings by what is described as an experimental block of flats. There is a difference of opinion on this policy between two committees of the council. The Public Works Committee recommends the expedient as a partial solution of the housing problem, whereas the Health Committee complains that it is a retrograde step and subversive of the interests of public health. The Health Committee is supported in its attitude by a letter written by Dr. John Robertson, medical officer of health for Birmingham, deprecating strongly the recommendation, and this letter the committee circulated among the members of the council, thereby bringing a good deal of criticism both upon itself and upon Dr. Robertson.

We do not propose to discuss the propriety of the Health Committee's action or that of the medical officer of health; but the general question as to whether it is advisable or not in these days of housing reform to erect blocks of tenement dwellings in congested areas for artisan tenants and their families is clearly one on which those responsible for or interested in the health of the community are entitled to express an opinion. A letter by Mr. Christopher Martin, consulting surgeon to the Birmingham and Midland Hospital for Women, which has also been published in the course of this Birmingham controversy, argues that small children living in such buildings are apt to be cooped up out of the sun and fresh air, and consequently to incur a serious risk of rickets. Dr. Robertson, in his letter, also expressed the opinion that the general result of life in flats is that young children suffer from very ill defined ailments and are definitely more susceptible to the influences which predispose to rickets than those who live in detached cottages. It is perhaps unnecessary to labour the point, so well recognized by all authorities on hygiene and sanitation, that, *ceteris paribus*, the prevalence of rickets is in inverse proportion to the opportunities which the children have for the enjoyment of sunlight and fresh air, and that infective disease has an incidence almost in direct proportion to the degree of congestion and the number of inhabitants to the acre. The troubles of overcrowding may be mitigated by piling dwellings one on top of the other, but they are not removed. For this reason it is to be hoped that the authorities of Birmingham—the home of progressive and resourceful municipal policy—will find a better solution of this difficult problem than to carry into effect the recent resolution instructing the Public Works Committee to proceed with the erection of this experimental block of flats. An amendment—that no family with children under 6 years of age should be accommodated on the upper floors—was incorporated in the resolution. A notice has been given to rescind the resolution, which, with the incorporated amendment, was passed amid some confusion, with the result that certain members of the council were not fully aware of what was taking place. We hope it will not be said of Birmingham, of all places, that it is building houses not fit for children to live in.

The London scheme, which was announced at the meeting of the London County Council this week, provides for the clearance of a slum area in St. Pancras, to the north of Euston Road, and the rehousing of the dispossessed persons in five blocks of flats, nine stories high. Colonel Levita, chairman of the Housing Committee, brought forward the proposal, but at this stage the committee makes no observations on its practicability so far as the provision of blocks of flats is concerned. It is stated that in any event the proposal is not intended to supersede existing methods of housing, but merely to offer a supplemental method for limited use on housing sites in central areas. The buildings, if the scheme goes forward, will be somewhat after the fashion of American city tenements, with light steel framing and concrete panels, and will provide nearly 600 flats. The amenities proposed include quick-running lifts, central heating and hot-water supply, with an open fireplace in each flat in addition to the radiators, dust shoots in every lobby, a direct lighting supply to every room, and through ventilation. Each flat would have a balcony where a baby could sleep in the open air, and on each block there is to be a roof playground. The buildings would be set back to a distance of forty feet from the present

roadways, so that the rooms on the lower floors would not be overshadowed. The proposal came in for some criticism at the meeting of the London County Council, but it received a greater measure of commendation, and one or two of the Labour members supported the idea. Colonel Levita said that he had long been aiming at high buildings. Such a nine-story building was within the limits of the Housing Acts, and he considered that these higher edifices were a weapon wherewith the problem of London housing might be attacked, and that St. Pancras was a place where the experiment might very well start. The Council agreed to spend £150,000 in dealing with this area of St. Pancras (which is known as the Ossulston Street area), including provision on the site for nearly all the 2,700 persons who will be displaced; but the proposal for the nine-story buildings, which is still in the realm of suggestion, is to have further consideration before it is adopted.

Whether the amenities in the London scheme can silence similar objections to those which have been urged against the Birmingham scheme is a matter which will have to be carefully considered when the proposals materialize. In the discussion in the Birmingham City Council it was stated that in Liverpool large blocks of eight-story flats are contemplated, and that Liverpool has been encouraged in such expedients by the success which has attended the provision of flats, of a less ambitious kind, in that city as a solution of the housing problem.

IODINE PROPHYLAXIS AND GOITRE.

LAST week we drew attention in these columns to the increasing use of iodized salt for the prevention of goitre, bringing our notice to an end on a somewhat diminuendo note. For it has seemed that the precise part played by iodine in regard to goitre prevention is not yet understood; that it is not clear that all endemic goitres are of the same order or due to the same cause; that there is little agreement as to the amount of iodine required to prevent simple goitre; and that its prevention seems to be a domestic problem for each country. Thus we hear of brilliant results from America and Switzerland, but in New Zealand they do not seem to be of the same order. The New Zealand observations are of the greatest interest because of the careful control which was exercised by Professor C. E. Hercus and Dr. E. S. Barker.[1] They excluded all bias by "taking pains not to know" at the various examinations which of the children had received iodine and which had not. The observations relate to Waimataitai School in Timaru, where 467 children were under observation for six months, and to the Christchurch schools, where 1,514 children were under observation for one year. In the former the system decided upon was to give 2 grams (31 grains) of potassium iodide a year to all children irrespective of age. After six months' treatment, during which time 20 (out of the 31) grains of potassium iodide were administered, the following results were obtained: the thyroid increased in size in 5.7 per cent. of normal children who received iodine; it increased in size in 4.8 per cent. of normal children who received no iodine. In previously goitrous children the results were of a like order: the goitre increased in size in 6.2 per cent. of those who received iodine, in 6.1 per cent. of those who received no iodine. So far as this school was concerned it does not appear that the prophylactic use of iodine influenced the incidence of goitre one way or the other. At the Christchurch schools the results are more encouraging. Sodium iodide was used in this case: children aged 11 and upwards were given 120 grains a year; those aged 8 to 11, 60 grains; those aged 5 to 8, 40 grains a year. The method of dosage adopted was to give a weekly dose for ten weeks in each term (of 4 grains, 2 grains, and 1½ grains respectively) in half an ounce of water. The results were these: the thyroid gland increased in size, during the fifty-two weeks of the experiment, in 55 per cent. of normal children who received no iodine, and in 39.6 per cent. of children who received iodine. In children previously goitrous the goitre increased in size in 43.5 per cent. of those who received no iodine, and in 21.4 per cent. of those who received iodine. In this group of schools, therefore, the prophylactic use of iodine for a period of one year reduced the incidence of freshly acquired thyroid swellings from 55 to 39.6 per cent. The fact appears to be significant that, despite the use of sodium iodide, 39.6 per cent. of children developed goitre, and that if iodine want is to be regarded as the essential cause of goitre its absorption at the intestinal threshold is a question of the first importance. It is significant also that among the school children of Christchurch the administration of iodine for a period of nine weeks was as effective as its administration for fifty-two. Thus, among normal children the results observed were as follows: nine weeks' treatment, 38.5 per cent. showed an increase in size of the thyroid; thirty-eight weeks' treatment, 39 per cent. showed an increase in size of the thyroid; and fifty-two weeks' treatment, 40.5 per cent. showed an increase in size of the thyroid. As to existing goitres, the observers noted that 15.4 per cent. of untreated cases at the Christchurch schools decreased in size, as compared with 35.4 per cent. receiving iodine. But in this note we are dealing with the prevention of goitre, not with its cure. This admirable piece of adequately controlled work by Hercus and Barker is one that should be repeated by skilled observers in a number of selected schools in this country before any further attempt is made to introduce a generalized system of iodine prophylaxis. For we would repeat that the goitre problem seems to be a domestic one for each locality in which goitre prevails.

[1] *New Zealand Med. Journ.*, xxii, p. 169.

THE OPIUM CONFERENCES AT GENEVA.

THE joint committee of sixteen which was instructed to endeavour to find a way out of the deadlock in which the two opium conferences at Geneva had become involved failed to find an acceptable formula, and on February 6th the American delegation withdrew from the conference. The Chinese delegate has also retired in consequence of the attitude assumed by the American delegation. Lord Cecil, on behalf of the British delegation, deplored the attitude taken up by Mr. Porter on behalf of the United States; he said there was no difference of opinion that the ultimate object was to restrict the production of opium and the coca leaf to medical and scientific needs; but the most effective control at present was to regulate the manufacture of drugs, and the British delegation was disappointed that in the whole American memorandum there was only a passing reference to this. It was proposed to set up a central control board. They would have preferred that the United States should have continued to co-operate. They would, he added, have been stronger with them, but would continue the work without them. From the incomplete reports of the debates which have as yet been received it would appear that the actual or ostensible split occurred over the date from which, after a period of ten or fifteen years, the import or export of "prepared" opium for smoking should, in the words of the Convention of 1912, be "suppressed" or "prohibited." The American and Chinese delegations desired that the date from which the period would run should be the present time. Lord Cecil, on the other hand, impressed with the extent of smuggling

from China and elsewhere to our Far Eastern dependencies, desired to make the fifteen years of grace run from an indefinite date, to be determined by the League of Nations, when satisfied that opium production in China had been so far curtailed as to remove the dangers of contraband import. It is reported from Delhi that the successful stand made by the British delegation at the Geneva conference against the American proposals is regarded with some satisfaction there. On the other hand, the Mahatma Gandhi is reported to have declared that "if the whole of the opium traffic were stopped to-day, and the sale restricted to medical use only, I know there would be no agitation against it worth the name. Furthermore, from the moral standpoint, there is no defence of the Indian opium policy." It is much to be regretted that the close of the Geneva conferences will, it is feared, leave the opium question in a more controversial state than it was at their inauguration. It is sincerely to be hoped that American co-operation, which was so helpful at Shanghai in 1909, and at the Hague in 1911-12, 1913, and 1914, may again be obtained in effecting that "suppression of the abuse of opium, morphine, and cocaine" which it was the object of the Convention of 1912 to achieve.

ANTIQUE MICROSCOPES.

THE celebrated collection of antique microscopes which was made by the late Sir Francis Crisp is to be sold by Messrs. Stevens, at King Street, Covent Garden, on February 17th, thus exemplifying the sad but common fate of nearly all private collections. Among the 371 lots in the catalogue there are many of great interest for their historical associations, their excellence of workmanship, or the beauty or quaintness of their design. In the seventeenth and the first half of the eighteenth centuries microscopes were not the severely practical utilitarian instruments with which we are familiar. The craftsman was not content with having done his best to turn out an optically efficient instrument. He further lavished his time and skill in ornamenting every available part of the apparatus, whether the microscope were a tiny simple hand microscope, such as that made in Augsburg in 1686, and represented in the illustrated catalogue as Lot 10, or the elaborate compound microscope nearly two feet high which furnishes the frontispiece. This microscope, which was made by Adams of Fleet Street about 1746, is of silver and most elaborately ornamented, so much so that, with its Corinthian column and allegorical figures, it looks more like a presentation centrepiece than a scientific instrument. There are several other interesting specimens by this maker in the catalogue which show the excellence of his work. An earlier English maker was J. Marshall of Ludgate Street (*circa* 1704), whose skill is well represented by several examples, such as Lot 118. In his microscopes the body or optical tube was generally covered with ornamented vellum or leather, and the mounts were of turned wood such as lignum vitae. Lot 132, of which a full-page illustration is given, is of twofold interest—firstly, because of the beautiful inlaid box base on which the compound microscope stands and in which it is to be packed, and secondly, because it was the property of Pope Benedict XIV, and bears the triple crown and the crossed keys in marquetry on its case. This Pope was elected in 1740, but whether he had any serious interest in science we know not. The perfect condition of the microscope and case and the completeness of the fittings suggest that they were not much or often used. Lot 255 is an extraordinary Dutch instrument, having a conical body two feet in length and a field lens five inches in diameter. This Brobdingnagian microscope is probably unique, but the same may be said of several other lots. Among the solar microscopes is one of which the body tube is supported by the uplifted arms of a carved allegorical figure, and another giant having a body twenty-four inches long and seven in diameter; only two instruments of the type are known; the other is in the Science Museum at South Kensington. There is such a wealth of interesting objects in this collection that it is difficult to do justice to them in one visit, and we wish that the auctioneers had found it possible to allow them to be viewed for more than one day and a few hours. We advise all those who are interested in the history of microscopy or in skilled workmanship to visit the collection on Monday next, February 16th, or before 11.30 on the day of sale, February 17th.

LEAD GLAZES IN COOKING UTENSILS.

FOR many years in this country leadless glaze has been employed for the earthenware manufactured for culinary purposes, but latterly there has been an increasing importation from abroad of casseroles, dishes, and similar articles in which a glaze with a high lead content is used. Representations to this effect having been made to the Ministry of Health, an inquiry was ordered as to the solubility of this glaze during cooking operations. An account[1] of this investigation, made by Dr. Monier-Williams, chemist in the foods division of the Ministry, has now been published. Having tested the action of citric acid solutions and of various foodstuffs upon a number of these vessels, Dr. Monier-Williams reports that, while there is no serious risk of lead poisoning resulting from their ordinary use in cooking, yet under certain conditions—for example, prolonged use with foods of a high degree of acidity—excessive quantities of lead may be dissolved from the glaze. Apart from this it was not possible to trace any connexion between the acidity of the foodstuffs and the amount of lead taken up. Dr. Monier-Williams does not consider that there is any valid reason why lead should occur at all in glazes, since leadless glazes are used by the great majority of English manufacturers of cooking ware. He adds that in any case it is apparently a simple matter for the manufacturer to produce lead glazes which show a negligible solubility, even on prolonged heating with citric acid solution. Much of the ware, however, that is now imported from the Continent appears to be of a low standard in this respect, sufficient care not having been taken in the control of temperature and the duration of firing in the kiln. It was considered advisable to extend the inquiry to enamelled hollow-ware in view of an outbreak of lead poisoning in 1922, due to the storage of beer in enamelled tanks containing lead. Dr. Monier-Williams found that the danger of injurious substances being taken up in significant amounts by foodstuffs from ordinary enamelled ware was remote. In one instance, however, a considerable quantity of boric acid was dissolved from the enamel of a frying-pan by tomatoes which were grilled in it. He concludes that if acid foods were heated for a long time in vessels of this particular make considerable quantities of boric acid might be dissolved out from the enamel.

TISSUE CULTURE.

THE cultivation of animal tissues outside the body, after being for some years little more than a biological curiosity, is beginning to show its value as a serious instrument of investigation. Dr. Carrel, one of the pioneers of the method, gave an address on its bearing on pathological problems to the Section of Pathology and Bacteriology at the Annual Meeting of the British Medical Association at Bradford last year, which was published with illustrations in our issue of July 26th. He then described the methods employed, and observed that though they were still in

[1] Reports on Public Health and Medical Subjects, No. 29: *The Solubility of Glazes and Enamels used in Cooking Utensils.* By G. W. Monier-Williams, M.A., Ph.D., F.I.C. London: H.M. Stationery Office. 1925. Price 6d. net.

their infancy and very crude, he foresaw that this mode of investigation would have an important bearing upon our understanding of pathological problems because it could reduce complex phenomena into simpler terms and bring to light some of their underlying principles. This method of investigation has been used in this country by several workers, and the President, Sir Charles Sherrington, communicated to the Royal Society on February 5th a paper by Dr. H. M. Carleton on the growth, phagocytosis, and other phenomena in tissue cultures of foetal and adult lung. The result of the investigation was to show that the invasion of the medium in a growing culture is the result of sheet-like epithelial outgrowth from the alveolar epithelium of cut alveoli; of radiating growth of fibroblasts from the connective tissue of the lung; and of "membrane formation," in which the cells of the cicatricial epithelium detach themselves from the implant. Organization of the cleft thus formed is effected by epithelial cells and fibroblasts. These three types of growth may coexist in the same culture. Within the implant there occurs a swelling up, and a detachment of, the alveolar epithelial cells. Mitoses are frequent in these, even in cultures of adult lung. Finally, the implant undergoes a fibroid transformation. A cicatricial epithelium, derived from that of the bronchi, grows over the cut edges of the implant. Sterile coal or carmine particles are actively phagocytosed by both foetal and adult lung *in vitro*. The alveolar epithelial cells are actively phagocytic, the dedifferentiated cells of the cicatricial epithelium less so.

INDIAN POPULATION PROBLEMS.

IN a paper read before the Royal Society of Arts (Indian Section) on February 6th, Mr. J. T. Marten, Census Commissioner for India, dealt with some of the problems which emerge from the statistical matter collected in the 1921 census of India. He said that India had a high birth rate, owing chiefly to the universality of marriage and the economic simplicity of living, and a correspondingly high death rate, including a large infant mortality. The difference between the birth and death rates was not greater than in many countries of Europe, and might perhaps be estimated at a normal of 7 or 8 per cent. in a decade. In India, as in every other country, the most prolific portion of the population was the lowest stratum. Of the fluctuating influences determining the periodical variations from the average, the most important, except the catastrophe of famine, was the effect of climate on health, and not any variations in the material conditions of the people. In the matter of housing, clothing, and diet the lowest strata of Indian people were probably not worse off than the slum population of Western towns. The dry years were, on the whole, the healthiest, though they were not usually years of economic prosperity. On the other hand, there appeared to be an intimate connexion between the quantity and distribution of the rainfall and the incidence of disease, such as malaria and dysentery. There was always, in an agricultural population, even among those near the subsistence limit, a considerable margin of resource which enabled them to resist in a remarkable way temporary stringency. Sir Edward A. Gait, K.C.S.I., a former Census Commissioner, who occupied the chair, said that when Mr. Marten estimated at 8 per cent. the normal decennial growth of the population due to the excess of births over deaths, he could not have meant that that was the rate of growth to be expected, for the average decennial increase in the five periods for which statistics were available was only half this figure. On three occasions the increase was 1½ per cent. or less, once it was 9½ per cent., and once 6½ per cent. What Mr. Marten no doubt meant was that 8 per cent. was the rate to be expected in a decade free from widespread famine and from exceptional unhealthiness. Even so this statement required some qualification, for the rate of growth in any given period was largely dependent on the age distribution of the population, and this varied greatly from time to time. In a severe famine the mortality resulting from insufficient and unwholesome food occurred mainly among the very young and the very old, many of whom, in the ordinary course of events, would have died a few years later, while people in the prime of life were but little affected. Consequently the period after a famine was one of exceptionally rapid growth, a high birth rate being accompanied by a low death rate due to the premature disappearance of many of the bad lives. The terrible influenza epidemics of 1918-19, which swept away 12½ million of the population, had an equally disturbing effect on the age constitution, but in the opposite direction. This disease was specially fatal to persons in the prime of life, so that at the commencement of the current decade there was an unusually low proportion of married women at the reproductive ages. Sir Edward Gait doubted whether the census of 1931 would show a growth equal to Mr. Marten's "normal" figure. He agreed, however, with Mr. Marten's conclusion that, apart from exceptionally severe and widespread famine, periodical variations in the rate at which the population of India grew depended more on conditions directly affecting the health of the people than on the degree of agricultural prosperity. He added that in India there was no such thing as "birth control." The lowest stratum might have a slightly higher birth rate, but he thought this was neutralized by a higher infant mortality.

PRISON AND THE PRISONER.

THE report of the Prison Commissioners for 1923-24[1] affords ample material for reflection, and much for congratulation. Less and less satisfactory are found to be the old methods of exalting the purely punitive side of imprisonment, while ignoring the many opportunities which prison life might afford of training prisoners to direct their thoughts and activities into channels which would provide them later with a sane alternative to crime. The Commissioners intend to take full advantage of all opportunities of training and re-education, and the record of their efforts in this direction is encouraging. There are several impediments to progress. One is the presence in the prison population of a number of weak-minded individuals who are neither insane nor mentally deficient in the technical sense, but are unable to benefit by any such scheme of training as is proposed for the normal prisoner. It is intended to place these under the charge of a special staff so soon as this can be provided. There is also the question of the association of young men in prison with hardened offenders. This under present conditions cannot be wholly prevented, and the Commissioners urge the provision of a separate establishment for young prisoners to ensure complete separation and special training. Lastly, there is the difficulty occasioned by the presence of longer-term prisoners along with those who are serving only a short time. The presence of the latter interferes with the proper working of an efficient scheme of training. The Commissioners have begun to meet this difficulty by using Wakefield Prison for the training of longer-term prisoners to the exclusion of others; since the experiment was initiated there have been very few cases of recidivism amongst the 218 men discharged. It need not be feared that the sole intention of the Commissioners is to render the prisoner's lot a happy one. Their object is to fit him for his duties as a citizen when he comes to be discharged. "The means to this end are," it is said, "fairly long hours of hard and steady work at an occupation which shall, if possible, give such industrial training as will enable the offender to earn his living;

[1] H.M. Stationery Office. Price 1s. 6d., postage extra.

the removal of needless degradations, and the encouragement of self-respect. The prison day should be hard, but the object is not mere severity. It should be interesting, but the object is not to make it pleasant. The aim is to make a citizen by quickening and directing the activities of both mind and body." There can surely be no two minds about the essential wisdom of such a project, tempered as it is by sound practical considerations. Coincident with the introduction of these reforms, and presumably because of them, there is said to be a marked change in the attitude of the prisoners themselves. As witness to this are the remarks of the governor of Hull Prison. "The atmosphere is now such," he says, "that a troublesome prisoner, instead of receiving at least sympathy from other prisoners as formerly, must plainly see that they regard him as being a disgrace to the establishment." The Commissioners pay special tribute to the increasing care exercised by the courts in the investigation of the circumstances of offenders and the avoidance of unnecessary committal to prison. The more liberal use of probation is urged in cases of young first offenders. Of the numerous reports submitted to the Commissioners that of the medical officer of Birmingham Prison (Dr. M. Hamblin Smith) calls for special mention, on account of the attack therein made on the system of committing offenders to prison without consideration of their individual requirements. He considers that the main cause of past failures has been neglect to recognize in criminal conduct a definite mental abnormality. He would have the problem of the delinquent envisaged alongside the problems presented by other mentally abnormal persons, and would have the treatment of the offender regarded as essentially a psychological problem. It certainly cannot be denied that many crimes have an undoubted psycho-pathological basis. Examples that may be instanced are many cases of pilfering in young persons, and the commission of offences because of an unconscious feeling of guilt. Such abnormal motivation of criminal conduct is only discovered by the expert psychologist; and in so far as Dr. Hamblin Smith's criticism of present methods draws attention to the need of such experts in the courts, it is of particular service. It is a far cry from that, however, to the doctrine that all crime is a disease made manifest, and some degree of caution must be exercised in accepting the tenets of a school of thought whose propositions are dangerously akin to such doctrine.

FRENCH SPAS.

PROFESSOR ALBERT ROBIN, who has written a preface for an album of the spas of France compiled by a French medical committee, thinks it necessary to apologize for the elegances of the volume and the beauty of the photographs it contains, and to insist that it gives also accurate information sufficient to guide a doctor in selecting a place suitable for his patient. This is true, but Professor Robin's serious intentions will, in not a few instances, be imperilled at a first glance because many French spas are in very beautiful situations; such are Aix-les-Bains, Cauterets, Allevard, Eaux-Bonnes, and Uriage, to mention only a few. Even in the plains the architect and town planner have gone far to make up for scenic deficiencies, and to reconcile the invalid to spending his days in sunny gardens and umbrageous parks. Vichy, for instance, is an excellent place in which to be lazy during the intervals left between the strenuous and varied therapeutic devices it so lavishly provides. There is, indeed, for very many people a fascination not easy to define about a well appointed French spa, whether in the Vosges hills, among the Pyrenees, or in the plains. The patient is expected to be up betimes, but the serious business of the day is got over in the morning, and in the afternoon rigid discipline is so far relaxed that he can feel himself once more his own master and indulge in such recreations as the state of his health permits. Owing mainly to the university vacation the French spas are most frequented in July and August. Professor Robin suggests that where possible the months of May and June, or September, should be chosen; the extremes of summer heat—which can be very considerable, not only in the plains, but in a southern mountain valley—are avoided, the doctors have more time at their disposal, and the hotels, being less crowded, are able to give more favourable terms to visitors. The pamphlet is issued in this country by the Office Français du Tourisme, 56, Haymarket, London, S.W.1, where full particulars of the qualities of each spa and the best way of reaching it can be obtained.

INFLUENZA.

LAST week the number of deaths from influenza in the great towns of England and Wales again increased, but less than in the previous week—namely, from 195 to 202, as compared with an increase from 142 to 195. London alone showed a greater rate of increase; the figures of the last three weeks were 36, 39, 48. Manchester was the only city other than London recording more than 10 deaths (18). Five others—Bury (5), Salford (7), Bolton (5), Burnley (5), and Leeds (6)—had 5 or more. There has been a further increase of notified pneumonia, particularly in London and the North, but the statistical indications do not make it probable that the present recrudescence will be very serious. While the mortality of this epidemic is not heavy, it is common knowledge that influenza has been extremely prevalent in many parts of the country during the past few weeks.

REX *v.* BATEMAN.

THE medical profession will, we doubt not, have learnt with a deep sense of relief that the Court of Criminal Appeal has allowed the appeal against the conviction and sentence of Dr. Percy Bateman, a medical practitioner of New Cross Road, London, who was found guilty on December 12th, at the Central Criminal Court, of the manslaughter of a woman patient, and sentenced to six months' imprisonment in the second division. An account of the trial appeared in the BRITISH MEDICAL JOURNAL of December 20th (p. 1179), and a full report of the application for leave to appeal in last week's issue (p. 285). This week we publish at page 334 a report of the proceedings in the Court of Criminal Appeal on February 9th and 10th. The case for the appellant was listened to with the closest attention by the three judges (the Lord Chief Justice, Mr. Justice Salter, and Mr. Justice Fraser), and Mr. Norman Birkett, K.C., in the course of his ably sustained argument, had the advantage of many illuminating questions and comments from the Bench. It will be seen that the Lord Chief Justice, at the conclusion of the case for Dr. Bateman and the reply for the Crown, said that the Court was of opinion that the appeal ought to be allowed and the conviction quashed, but that in view of the importance of some of the questions raised their lordships proposed to consider their judgement and to deliver it at a later date. In view of this we think that comment by us should go no further at the moment, beyond expressing satisfaction at the outcome of this most important and most distressing case.

WE are glad to learn that Dr. Herbert Jones, whose recent illness has caused his many friends some anxiety, is making satisfactory, though slow, progress towards complete recovery. Dr. Herbert Jones was president of the Society of Medical Officers of Health a few years ago, and president of the Section of Public Medicine and Industrial Diseases of the Annual Meeting of the British Medical Association at Bradford last year.

THE NEW MISSING LINK.

BY

SIR ARTHUR KEITH, M.D., F.R.S.,

CONSERVATOR OF THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND.

PROFESSOR RAYMOND DART, whose discovery of a "missing link" in South Africa has fallen like a bombshell on anthropological Europe, is well known to British anatomists. He is one of the many young medical graduates of Sydney University whose minds were bent towards research in anatomy by Professor J. T. Wilson, before this distinguished anatomist left Australia for Cambridge. In post-graduate days Professor Dart worked at University College, London, with Professor Elliot Smith, at the Royal College of Surgeons, and in research laboratories of the United States. He went to Johannesburg some three years ago to occupy the chair of anatomy in the University of Witwatersrand. In South Africa he found an earnest band of investigators opening up unexpected chapters in the early history of man. Old river-beds were yielding a sequence of stone implements almost as ancient as those of Europe. The remains of a fossil man had been found at Boskop, and soon after Professor Dart's arrival other human remains were found deep in the floor of a rock shelter on the southern coast of Cape Colony. These were examined by Professor Dart, and found to be of the Boskop race. Then came the discovery of Rhodesian man in the bowels of a limestone kopje in Rhodesia—a much older and more primitive type than that of Boskop. And now comes an equally remarkable discovery which is largely due to the initiative and perspicuity of Professor Dart.

Norma facialis of *Australopithecus africanus* aligned on the Frankfort horizontal. (Reproduced here by the courtesy of the Editors of *Nature* and of the *Illustrated London News*.)

In November last a lady demonstrator brought him the fossil skull of a monkey—a baboon. It came from a limestone quarry situated at Taungs, eighty miles to the north of Kimberley. There the quarrymen had worked their way 200 feet into a limestone bluff which rises 50 feet above the dry veldt of the surrounding country. The monkey's skull was blasted from the rock. Finding that his colleague, Dr. R. B. Young, professor of geology, was going to Taungs, he asked him to inquire into the source of the fossil bones in the quarry. Dr. Young arrived at the quarry in time to receive a mass of material just blasted from the base of the working face of the quarry. He gathered the fragments, and handed them to Professor Dart on his return.

In the mass of limestone Professor Dart found a cast which had formed within the brain cavity of a skull, and from the adjoining block he chiselled out the forehead and complete facial parts which went with the brain cast. The blasting had shivered and destroyed most of the cranial bones. From these fragments the discoverer reconstructed the being to which he has given the name *Australopithecus africanus*. So exact and clear are his drawings and his descriptions that those who have studied his preliminary account in *Nature* (February 7th, p. 195) have all the data placed at their disposal for coming to an independent opinion. Indeed, those who have charge of much larger collections of anthropoid and human skulls and brains than were at the disposal of Professor Dart have a somewhat unfair advantage over him. But with all these disadvantages against him his main conclusions are certain to stand.

He speaks of this new being as a "man-ape," and as standing "between living anthropoids and man." These are his expressions, but when we examine his text we find him quite alive to the fact that the animal he has brought before the scientific world is a man-like ape or anthropoid. The size and convolutionary pattern of its brain leaves one in no doubt of this matter. Many fossil fragments of higher anthropoid apes have been found on previous occasions in Europe and India, but this is the first time we have seen the complete face of one of them. In this case the animal is young; the first permanent molar teeth have cut and are coming into place; this happens in the gorilla and chimpanzee towards the end of the fourth year—two years earlier than in human children. The face in all its lineaments is that of an anthropoid; there are blended in it some features of the chimpanzee, others of the gorilla, and some which belong to neither. But of humanity there is no trace save in one respect—its jaws are smaller and its supraorbital ridges less developed than in a chimpanzee of a corresponding age. There is a reduction in jaw development, and such a reduction has certainly taken place in the evolution of man. Further, the milk canines are less pointed than are those of the young chimpanzee, and the interdental space in front of the upper canine is less.

In volume the brain of this new anthropoid is of the size we find in young gorillas, but its shape is different. In the brain of the gorilla the width is 82 per cent. or more of its length; the gorilla—and the same is true of the two other living anthropoids, the chimpanzee and orang—is round-brained. The gorilla is low-brained; its height is small compared with its length. Australopithecus is long-brained; from Professor Dart's measurements one infers that

the width was 71 per cent. of the length; the brain is compressed from side to side, and is high. Thus, amongst anthropoids, as amongst living races of mankind, we have long-heads or dolichocephals and round-heads or brachycephals. Earth pressure may compress a skull from side to side and thus alter the natural shape of the brain cavity, but one may be sure that Professor Dart was alive to this source of distortion and excluded it.

Thus we have made known to us a high anthropoid, one which is clearly related to chimpanzees and gorillas but differs from both, and in the points wherein it differs making some approach towards man. Its exact relation to the human phylum will be cleared up by its geological age. To have any claim to stand in or near the human line of descent it must be able to claim an early Miocene date at least.

All living anthropoid apes are confined to tropical jungles. The limestone bluff which served as a tomb for this new anthropoid child lies 2,000 miles from the haunts of the gorilla and chimpanzee. The first supposition one makes—and it is justified by what we know of Europe—is that the climate of South Africa has changed, and that the tropical belt had once spread over the arid deserts of Bechuanaland. Professor Dart, on the other hand, leans to the supposition that Australopithecus may have assumed the posture and habits which have become perfected in man, and was thus able to wander far beyond the jungle limits. We cannot be certain of posture until we find a bone of the lower limb. One cannot see any character in the skull which justifies the supposition of an erect posture.

Further evidence will make clear how this fossil skull, and numerous others belonging to monkeys of the baboon type, became embedded in the limestone cliff at Taungs. One infers that in these limestone cliffs caves had formed, and that they again, with a change in climate, became filled and obliterated by stalagmite forming on their floors and walls. Animals which had died in the cave would thus have their bones preserved as fossils. These caves may not be older than late Pliocene or earlier Pleistocene.

However this may prove to be, there can be no doubt of the high importance of Professor Dart's discovery. He has found and given an exact and full description of a new and high kind of anthropoid ape; it is not only a missing link but a very complete and important one, but it lies altogether at the anthropoid end of the chain which culminated in man. It is a discovery which places Professor Dart's name in the front rank of students of the evolution of man and anthropoid.

France.

[FROM OUR OWN CORRESPONDENT.]

Travelling.

THE French have ceased to deserve a reputation for ignoring geography. At any rate, as regards the medical world, we have many opportunities of travelling, if it were but on account of the numerous congresses. But now Dr. Loir of Havre, a great believer in thalassotherapy, is inviting us to make sea trips so that we may preach to our patients from personal experience to do the same. For those of us who can find time to take a three weeks' holiday this would be a marvellous opportunity of touring round the Mediterranean, in congenial company, and of studying some scientific subjects. If our many schools are represented on board they are sure to have quite a good discussion on the ever new subject of *πανσία*. An invitation perhaps even more tempting is extended to all medical men —foreigners and French—by the Cie Transatlantique to visit Morocco and Algeria. Two tours have been organized; one leaving Bordeaux on March 30th for Casablanca and returning from Algiers so as to reach Marseilles on April 24th; the second leaves Marseilles on April 18th and terminates in Bordeaux on May 14th. The travelling by land will be by motor car, and all places of interest are to be visited under expert guidance. Full information can be obtained from Dr. V. Gardette (3, rue Alexandre de Humboldt, Paris 14).

A striking novelty in Morocco is the aerial ambulance service for the French expeditionary corps. Some 1,500 patients have already been evacuated through the air with no mishap. In many cases the time saved was in the ratio of a minute to two hours—namely, a twelve minutes' flight would bring a wounded man to a comfortable and safe refuge which could not have been reached under twenty-four hours by land transport. One plan is to bring the patient to the surgeon, and another is to bring the surgeon to the patient. Therefore the *aero-chir*, which is nothing less than a flying operating theatre, has been brought into existence. Professor Tuffier was the first to use such an apparatus in Morocco when rendering first aid to a French officer. The demonstration has been so complete that a medical member of Parliament, M. Chassaing, has proposed that every part of France should be equipped so as to allow the rapid evacuation by air of urgent cases. Realization sometimes works quicker than imagination.

Physician v. Physicist.

Modernization of methods was never better illustrated than at one of our medical *concours* in a provincial faculty. The subject of a written paper had been given to the candidates and they were secluded from the wide wide world, when the dean was called on the telephone and informed that one of them was communicating with the outside by means of wireless; should he call at such and such room he would certainly be edified. Incredible as it seemed, the fact proved true. Asked what he was doing with that microphone, a young man answered that he was "experimenting." He was informed that the nature of his experiments was sure to interest the magistrate and that in the meantime if he handed over his resignation from his present appointment it would certainly be accepted. So this young man will have to devote his capacities to some other branch of science than medicine. We suggest physics.

The Fight against Tuberculosis.

The President of the Republic took the chair at the Sorbonne last week at the meeting of the committee of the various associations fighting tuberculosis. In our country, where the problem of natality is appallingly urgent, the question of protection of infants is of the utmost importance. Professor Calmette showed that preservation is obtained every time that infants are separated from an infected parent. His suggestion is to provide for the child as soon as possible after birth. The country is well armed for that purpose, and statistics prove that many lives are saved. Cruel as it may seem to have one's child taken by hygienists, still it is less cruel than to have it taken by meningitis. The education of the public has now progressed enough to make this understood and accepted. In the same spirit our first mountain sanatorium for heliotherapy has just been opened at Odeillo in the Pyrenees, at an altitude of 5,000 feet. It is open to children under the protection of a certain number of institutions, priority being given to war orphans.

Bone Prothesis.

In the Necker Hospital amazing improvements are being carried out in osteoprothesis. The way bone can be replaced by plated ebonite can only be believed by those who actually see the patients and the skiagrams. Dr. Robineau has been waiting to publish his results until a sufficient number of years should have elapsed to make them certain. At the International Congress of Military Medicine (Paris, April 20th to 25th) we may expect to hear a few startling papers. This congress, with its wide opportunities of visiting various parts of France, is proving quite a success, and we hope that our British comrades will not miss this opportunity. Lest we forget!

G. MONOD.

Ireland.

HONORARY F.R.C.P.I. CONFERRED ON SIR HUMPHRY ROLLESTON.

SIR HUMPHRY ROLLESTON, Bt., K.C.B., President of the Royal College of Physicians of London, was on Saturday last admitted to the Honorary Fellowship of the Royal College of Physicians of Ireland. The function took place in the College Hall, Kildare Street, Dublin, in the presence of a large and distinguished gathering. The Governor-General, the Provost of Trinity College, and Lady Aberdeen attended. The President, Sir William Thompson, who presided, welcoming the visitors, said that the most valued of many highly prized heritages of the College was its option to confer its Honorary Fellowship, from time to time, on men who had distinguished themselves in the profession of medicine, the allied professions of science, literature, and the fine arts. This privilege had always been most jealously and meticulously guarded, and none but those outstanding in their professions had ever been admitted. In the case of Sir Humphry Rolleston the College had no hesitation in unanimously electing him to Honorary Fellowship. In his address conferring the honour the President said that the College had 3,200 on its rolls, and they felt honoured in adding to that number one so distinguished in the medical profession. They had all watched with interest, pleasure, and pride, Sir Humphry Rolleston's steady progress on the ladder of success to his present unassailably eminent position. They all earnestly prayed that the new Fellow would long be spared to enjoy not only the Honorary Fellowship of the College, but the many other distinctions and honours which had been so deservedly conferred on him. Sir Humphry Rolleston was then duly admitted to the Honorary Fellowship and signed the roll.

The new Fellow returned thanks for the honour conferred on him, and proceeded to read an address on individual links between the Colleges of London and Ireland. His admission as a Fellow of the Irish College was a tribute, he said, to the sister College in London. These two Colleges had the same ideals as their aim: their pharmacopoeias were on the same lines, and the Presidents of the Irish College had been members of the Decennial Committees for the nomenclature of diseases. In the eighty years from 1836 to 1916 it was of interest to know that no less than twenty-eight Fellows of the London College, including presidents, had been by courtesy admitted to the Fellowship of the Irish College. Although younger, the Irish College had done what the London College had not done—last year it had admitted a lady, Mrs. Mary Hearn, as a Fellow. The Irish College as far back as 1877 had taken the lead in admitting women as licentiates—an example not followed by the London College till 1909. In addition to their great founder, Dr. Stearne, the lecturer referred to many prominent men who had been connecting links between the two Colleges. Sir William Petty, one of the original thirteen members, had been described as one of the most remarkable figures in Irish life. He had served as Physician-General to the Army, and had undertaken the task of surveying the country for the purpose of distributing the lands. In the following century there were at least three distinguished Irish physicians who contributed to strengthening the ties between sister colleges. These were Sir Edward Barry, Dr. Anthony Pelham, and Dr. Thomas Brooke. Barry was born in Cork about 1689, and after practising there came to Dublin, where he quickly won a high reputation, which was enhanced by a very learned work which he published on *Consumption of the Lungs*. He was Physician-General to the Forces, and was elected M.P. for Charleville. Later he went to London, and was admitted a Fellow of the London College, as were his contemporaries, Pelham and Brooke.

Proposing a vote of thanks to the lecturer, Dr. Walter Smith, Father of the College, and ex-president, said the name of Rolleston required no adventitious illumination. Sir Humphry's father, George Rolleston, was a man of graceful character, and had won merit as a professor at Oxford University. Sir Humphry Rolleston had made some notable contributions to medical literature. He had spread his activities in many directions, and had served his country in several capacities in peace and war. It was no wonder that numerous honours and distinctions should fall to his lot, including being gazetted Surgeon-Admiral of the Royal Navy, an unusual distinction for a physician. In addition to his other qualities he had a facile pen, and had written a very interesting and instructive book on *The Medical Aspects of Old Age*. Sir John Moore, who seconded the vote of thanks, said that Sir Humphry Rolleston's record was one of unparalleled service to humanity, and in particular to the soldiers and sailors of His Majesty's Forces, giving them the advantage of his knowledge and skill during the great war, when he was consulting physician to the Royal Navy. His admission to the Fellowship of the Royal College of Physicians of Ireland forged one more link in the golden chain which bound the two Colleges together. The vote of thanks was carried with acclamation, which Sir Humphry Rolleston acknowledged, and the proceedings terminated.

THE ROYAL VICTORIA HOSPITAL, BELFAST.

Dr. R. Marshall delivered a very interesting address to the Belfast Medical Students' Association on February 4th. Professor Fullerton was in the chair, and many of the visiting staff were present. The lecturer gave a brief account of the first records of hospital and dispensary work, and referred more fully to the *History of the General Hospital*, by A. G. Malcolm, M.D., one of its physicians, published in 1851; he also quoted some of the figures from early annual reports; these showed the gradual and steady increase of operations, number of admissions, and general work of the institution. The name was changed from the General Hospital to the Royal Hospital, and then, when it migrated to its present site, to the Royal Victoria Hospital in 1903. It was impossible to mention all the benefactors—their number was too large—but members of the Donegall family were always to the fore; for its present building and equipment the hospital was deeply indebted to the late Lord Pirrie, and to its president, Lady Pirrie.

The members of the medical staff, the superintendent (Colonel Forrest), and the students joined in warm and appreciative thanks to Dr. Marshall; reminiscences of earlier days, often of an amusing and not strictly professional nature, were related.

THE JUBILEE NURSES.

Lady Elizabeth Kenmare, president of the Queen Victoria Jubilee Institute for Nurses, in the course of a communication addressed to the press, states that recent appeals, first for the endowment fund of the Queen Victoria Jubilee Institute for Nurses, and, secondly, for the relief of the distress in the West carried out by the Jubilee nurses working under Lady Dudley's scheme, have created a confusion in the mind of the public. It is desired to make it clear that the joint work is carried out by two committees under one organization. Twenty-five Queen Victoria Jubilee Institute nurses are partially maintained by a fund raised by the late Rachel Lady Dudley. They are managed by a committee in Dublin, because in the isolated districts where they work there is no possibility of forming local committees of management or of raising funds. The supposition that there are two independent organizations is harmful to both, as the work is one and the same, only differing in the fact that twenty-five nurses are managed from Dublin and the others by local direction.

England and Wales.

MANCHESTER SANATORIUM.

MANCHESTER City Council has decided to proceed with the scheme for installing 210 beds for tuberculous children at its sanatorium at Abergele; a further addition of 336 beds is contemplated in the future. The sanatorium is placed in an estate of 355 acres, and the new buildings to accommodate children will be erected on a plateau separated by a narrow gorge from the main buildings of the sanatorium. A south-easterly aspect enables the full value of the morning sun

to be obtained, with protection from the heat of midday and the afternoon. The Manchester Education Committee will undertake the supervision of education and of the teaching staff for these children. At present there is only accommodation for ten children in a small cottage on the estate.

BLACKBURN HEALTH EXHIBITION.

The Publicity Committee of the County Borough of Blackburn has organized a health exhibition which opened on February 11th and will continue until the 21st. The exhibition is entirely educational, without any commercial side; it has been prepared by the Central Council for Infant and Child Welfare and the staffs of the borough departments, particularly those concerned with public health and cleansing. Daily lectures have been arranged and also visits to the hospitals, open-air schools, farms, welfare centres, and other institutions. In connexion with the exhibition a handbook has been published, describing its objectives and some of the schemes for improving the public health in Blackburn. Short descriptions, illustrated by photographs, are provided, and make it possible to appreciate the great extent and value of the work that is being carried on. An interesting table is supplied of the cost of the various activities, both actually and also expressed in terms of a penny rate. Another table illustrates the reduction in sickness and the death incidence during the last forty years. The great reduction in infant mortality since 1890 is shown by a striking chart; this rate has been reduced to less than half, the reduction representing a saving of 221 infant lives each year. In connexion with the exhibition sermons will be preached in various churches, and health plays are being performed.

NEWCASTLE-UPON-TYNE.

Plastic Surgery of the Face.

Mr. H. D. Gillies, surgeon to the Queen's Hospital, Sidcup, recently gave an address to the members of the Newcastle-upon-Tyne and Northern Counties Medical Society in the Royal Victoria Infirmary, Newcastle. In introducing the lecturer the President, Dr. Charles, alluded to the high character of the work Mr. Gillies had done, which entitled him to be regarded as a surgeon-artist. Mr. Gillies, in an admirable address, illustrated by lantern slides and photographs, riveted the attention of his audience by the description of his operative methods, the originality of which was fully recognized. The first thing necessary in every case, he stated, was to make a diagnosis, for without it no adequate treatment was possible. On the screen he showed how he obtained large skin grafts from the abdominal wall, transplanted these to the arm, for example, and subsequently from the arm to the face. These "sausage grafts," so called from their shape and consistence, supply an excellent type of skin, as was seen in the case of a young woman to whom he had, practically speaking, given, externally, a new neck. From the lantern slides it was readily observable what wonderful results had been obtained by the transplantation of sausage and Thiersch pressure grafts to faces which had been rendered repellent as a consequence of shell wounds or burns. In the evening the lecturer was entertained to dinner in Tilley's rooms by the council of the society. Twenty sat down to dinner. The chair was occupied by Mr. Willan, and the vice-chair by Mr. T. A. Hindmarsh. After the loyal toast had been honoured, Sir Thomas Oliver proposed that of "Our Guest," and in doing so said he regarded it as a great privilege that as a physician he should have been called upon to propose the health of their distinguished visitor. During the war the speaker had visited the hospitals in Amiens and Paris, where he saw, and was impressed by, the plastic face surgery which the French and American surgeons were doing, but the address to which he had listened that afternoon, and the results achieved by the operator, made him feel proud of British surgery. He congratulated Mr. Gillies on the success he had already attained. It was a line of practice in which he was pre-eminent. The toast was received with musical honours. On the following afternoon, in one of the theatres of the Royal Victoria Infirmary, Mr. Gillies operated upon two patients, in one of whom he prepared an abdominal graft for the treatment of extensive ulceration of the skin over the tibia.

Lectures on Citizenship.

In the Church of the Divine Unity a course of Sunday evening lectures is being delivered, the title of the course being "The town we live in." Last Sunday the second lecture was given by Professor Harold Kerr, medical officer of health for the city, who chose for his subject "The city healthful." Dr. Kerr dealt with such subjects as the increased longevity of recent times, the reduction of infantile mortality rate, the marked improvement in the death rate of tuberculosis, and with slums and the public parks. The lecturer brought his address to a close by appealing to the people of Newcastle themselves, who must, if they wish to have a "city healthful," personally co-operate in order to attain that end.

LEICESTER ROYAL INFIRMARY.

The annual meeting of the governors and subscribers of Leicester Royal Infirmary was held on January 28th. Mr. H. Johnson, house-governor and secretary, in presenting the annual report, said that the new wing added to the hospital had been instrumental in reducing the waiting list of patients from several hundreds to less than one hundred. The admissions to the adult ward had increased from 4,143 in 1923 to 4,758; but the admissions to the children's hospital had decreased from 756 to 719. There had been an increase in the number of in-patients from 4,899 to 5,477. During the year the increase in attendances in consequence of accidents had risen from 83,512 to 89,426; accidents in the street, and in factories owing to their increased number, were becoming more numerous week by week. The governors had authorized the expenditure of approximately £5,000 for additions to the casualty department, which was erected about twenty-four years ago. It was expected that there would be a deficiency of about £9,000 on the year's working, the total expenditure being £74,000, as compared with £65,000 in the previous year, and the income being £64,160. The sum of £9,000 from special donations and legacies had been added to capital. It was evident that no less than £10,000 a year was needed in the way of new income, but the appeal that had been made for £100,000 was now approaching completion, £92,000 having already been received.

THE FREEMASONS' HOSPITAL.

The annual meeting of the Freemasons' Hospital and Nursing Home in Brompton Road, London, was held on January 28th, the chair being taken by Lord Marshall of Chipstead, Past Grand Warden. The chairman's report stated that during the previous year 481 patients had been admitted, as compared with 427 in the previous year; the number of operations had increased from 374 to 449. On several occasions the waiting list had been as high as forty. During the year £1,725 had been devoted to the assistance of 110 patients who were unable to pay the hospital fees. The board of management had decided to close the list of founding lodges. An extension of the hospital would soon be necessary, although only surgical cases were dealt with. Lord Marshall, in presenting the treasurer's report, appealed for further donations in view of the increased number of beds that had been provided. At the end of December the £120,000 required for the endowment fund had been secured, and the invested funds were now nearly £110,000, but the excess of expenditure over income during the year had amounted to £2,579.

CLEAN MILK.

The importance of clean milk is being more and more recognized alike by producers, purveyors, and consumers, with the result that apart from Government departments voluntary organizations are taking an active part in the movement for attainment of perfection in the provision of this article of primary importance to infant and general welfare. The council of the National Clean Milk Society has now issued a print of recommendations in respect of immediate future milk legislation. It urges that the Tuberculosis Order of 1914 should be reintroduced with an amendment relating to compensation for condemned and slaughtered animals, the point being that the amount paid to the owner should be limited to the sum received by the local authority for the value of the carcass. Also it advises

that the Acts of 1915 and 1922 be consolidated subject to certain amendments. Such designations of milk as "guaranteed," "nursery," and "invalid's" should, the society holds, be illegal, and only those should be allowed which are referred to in Milk (Special Designations) Orders; milk should be sold by imperial measure; a local authority should have power to prohibit the sale in its area of milk if it finds the public health "is or is likely to be endangered" thereby; pasteurized milk should be so described; centrally approved model milk regulations, including classification and bottling, should be adoptable by local authorities; in boroughs of over 50,000 inhabitants there should be power, with central consent, to require the pasteurizing of all milk other than "certified" or "Grade A (tuberculin tested)." Other recommendations relate to milk designations, bottle caps, inspection by local authorities, and regular reporting of the results of inspection to the Ministry of Health. It will be seen that the society has given much attention to the details of milk provision and sale, and no doubt in its turn the Ministry will give careful consideration to the advice of a body which specially devotes itself to the subject.

CENTRAL MIDWIVES BOARD.

At a meeting of the Central Midwives Board on February 5th, when Sir Francis Champneys was in the chair, the Standing Committee dealt with a letter from a county medical officer of health as to midwives who had not notified their intention to practise, with regard to the calling in of medical aid and other points connected therewith. A reply, drafted by the chairman, was approved. Information had been received from the institution at which, recently, nitric acid had been used in mistake for silver nitrate, stating that the use of nitric acid had been discontinued. Dr. Rhoda Hicks Butler Adamson was appointed to fill the vacancy, caused by the death of Dr. J. B. Hellier, as examiner at the Leeds Centre. It was reported that the representatives on the Board of the various bodies had been reappointed without any change. The next meeting will be held on March 5th.

PRESENTATION TO DR. WRIGHT HILL.

Dr. J. Wright Hill, who was recently presented with several gifts by his friends on the occasion of his retirement after thirty-eight years' medical practice, took a very active share in the administrative side of medical work. He was a member of the West Ham Panel Committee and chairman of the East Ham Panel Committee. He is at present the chairman of the Stratford Division of the British Medical Association. During the war, besides his very heavy clinical work, he served as chairman of the local branch of the British Red Cross Society, in consideration of which he was appointed a governor of Queen Mary's Hospital, Stratford. Dr. Hill is also a justice of the peace.

Scotland.

ROYAL MEDICAL SOCIETY OF EDINBURGH.

THE annual dinner of the Royal Medical Society of Edinburgh was held in the hall of the Royal College of Physicians on February 5th, Dr. T. Drummond Shiels, M.P., presiding over a company numbering about 120. The guest of the evening was Mr. Alexander Miles, M.D., F.R.C.S., and among those present were: Lord Provost Sir William Sleigh, Professor G. Lovell Gulland, P.R.C.P.Ed., Sir Harold Stiles, P.R.C.S.Ed., Sir Robert Philip, and Surgeon Commander P. L. Crosbie, R.N. The chairman, proposing the toast of the guest, said that on the roll of the guests at the annual dinners of the society there were many eminent names, and they were proud to add to that roll the name of Mr. Alexander Miles, who was not only a great surgeon but also a great teacher, which was even rarer. Mr. Miles, proposing the toast of the Royal Medical Society of Edinburgh, said that it was, and always had been, a students' society; the bulk of its members were still undergraduates. It was true that a few remained in active membership for a year or two after graduation, but these were usually house-physicians and surgeons in the hospitals or assistants in the laboratories of the professors and lecturers. It was well authenticated that the society was founded in August, 1734, and that it was thus the oldest medical society in the kingdom. Its inception was due to six students, who, after spending a social evening together in a tavern, agreed to meet once a fortnight in their respective lodgings, where a dissertation in English or in Latin on some medical subject would be read by one of them and be discussed by the others. This band of six was soon joined by one whom they were always proud to count among the founders of the society—the celebrated William Cullen—who perhaps more than any other man served to make the foundations sure. At the time when the society was founded medical opinion was in a state of flux. Medical practice had for long been based on the doctrines of speculative philosophers, of whom Boerhaave of Leyden was the chief apostle. A new school directed by Hofmann sought to replace these abstract theories by knowledge based upon observed facts. Cullen was one of the leaders of this school; he exerted a powerful influence upon his fellow members, stimulating them to think and to observe for themselves, and to question on every point the voice of authority. That had always been, and still was, the spirit which pervaded the society. It was an interesting coincidence that they were meeting on the anniversary of his death 135 years ago. It was mainly through the influence of their society on the Edinburgh school that the doctrines of Hofmann and his experimental system triumphed eventually.

In 1737 the society drew up a constitution and adopted the name of the Medical Society. In 1778 it became incorporated under Royal Charter, and a hall was built in Surgeons' Square, where the members remained till 1852, when they acquired the present hall and offices in Melbourne Place. The society had one of the finest medical libraries in the country, containing well over 30,000 volumes. During the war years, however, its revenue suffered seriously, with the result that there was a curtailment of the books purchased for a series of years, and a large gap existed on the shelves of what was an otherwise complete library. Mr. Miles appealed to old members of the society who could spare any books published during these lean years to communicate with the curator of the library. The membership of the society included the names of many men who had made medical history in this country for nearly two centuries. Among its most distinguished members in medicine Mr. Miles mentioned Andrew Duncan, Richard Bright, Marshall Hall, Robert Christison, Douglas Maclagan, Byrom Bramwell. In surgery there were the Bells, Robert Liston, William Fergusson, James Syme, and —the greatest of all—Joseph Lister; whilst in obstetrics there were James Young Simpson, A. R. Simpson, and Halliday Croom. A great many of their members had also become distinguished outside medicine. Such were Mark Akenside, the poet; Oliver Goldsmith; Mungo Park, the explorer; Sir Henry Holland, the traveller; Sir Gilbert Blane, who introduced lime juice into the navy; Sir Charles Hastings, the founder of the British Medical Association; Robert Finlay; Thomas Addis Emmet, the Irish patriot; and Charles Darwin. The society was now an integral part and one of the most valuable assets of the medical school.

PROPOSED COLONY FOR THE FEEBLE-MINDED.

Lord Provost Sir William Sleigh presided at a public meeting held in the City Chambers, Edinburgh, on January 27th by the Edinburgh Women Citizens' Association, to further a scheme for the establishment in Scotland of an industrial colony for the permanent care of the feeble-minded. Lady Leslie Mackenzie, Chairman of the Scottish Council of Women Citizens' Associations, said that the several associations had come to the conclusion that the time was opportune for action. The word to be stressed was "permanent." It was true that school boards had power to establish special schools where children could be trained until the age of 16, but the feeble-minded remained children in mind no matter what age or size they reached, and it was calculated that somewhere between

two and three hundred left the special schools every year. The object of the proposed colony was to take permanent care of inmates at all ages, to give as much school work as was necessary, and to train the inmates for work with complete separation of the sexes and proper classification of faculty for work under skilled supervision. They aimed at establishing a type of institution which would become an interest and impetus to local authorities and others concerned in this serious social question. Professor G. M. Robertson, physician superintendent of the Royal Edinburgh Asylum, sent a letter expressing his cordial sympathy with the object which the association had in view; education during school years might, he said, do much to lighten the burden of the individual defective, but could not endow him with what Nature had denied—the capacity to carve his own destiny and hold his own in the face of manifold temptations. The defective, like a child, might have a highly developed imitative faculty which, unless carefully tended, was a source of infinite danger, not only to the defective himself, but to the community. Much of the good of school training was rapidly undone when the defective was turned out into the world to fend for himself; his fate there depended almost entirely on the environment in which he was placed. Many became a burden on the community, and by propagating their own kind kept open this social sore. Experiments had been conducted in America and England which clearly showed that the industrial colony afforded a real means of grappling with the problem, for in such a place the economic worth of the defective might be exploited to its maximum extent, while at the same time he was shielded from everything that in the outside world led to his breakdown. Sir Arthur Rose, Chairman of the Board of Control for Scotland, stated that it was really the duty of the State to attempt to solve this problem. The State before the war had recognized its responsibility and passed a useful Act which provided for the care of the mentally defective, but the war had intervened and the Treasury now set an embargo on local authorities putting the provisions of the Act into force. It had begun to lift the embargo, but only to a modified extent, although it was gratifying to notice that certain enlightened local authorities in Edinburgh, Glasgow, and Govan had been so impressed with the importance of the work that they were, on their own initiative, going ahead with its development. Still in Scotland, at the present time, the amount of provision being made for these cases was hopelessly inadequate. Dr. H. C. Marr, one of the Commissioners of the Board of Control, said that on the whole mental deficiency and mental disorders were distinguishable; and, while in regard to the latter purely hospital treatment was necessary for cure and amelioration, in regard to mental defect care and an educational system were required. Many children could not be educated in the schools that were available, and the consequence was that a large number of mentally defective persons were passing into a life of irregularity and crime. There were nine institutions for the care of mental defectives, and in these, as well as in private dwellings, there were now under supervision in Scotland over 2,000 mentally defective persons. Even if this accommodation was increased by 1,500, as was proposed, the Scottish provision for mental defectives would still be lamentably small, and there was urgent necessity for the scheme proposed by the Women Citizens' Associations. Lord Sands, in moving a resolution pledging the meeting to support the efforts of the Scottish Council of Women Citizens' Associations to establish in Scotland an industrial and farming colony for the permanent care of the feeble-minded, said that there would be no difficulty in finding abundant material for such a colony. Mental defectives, after school life, lost a great deal of the benefit they had gained. Many of them led very unhappy lives, and were also the cause of unhappiness to others, of depression, anxiety, and humiliation. There were also many moral dangers in allowing them to be at large in the community, and segregation, he was sure, would make for their own happiness. Work was the great source of happiness, and they would all be taught trades and treated with sympathy, tenderness, and love. Mr. W. H. Mill, in seconding this resolution, stated that the number of mentally defective children of school age in Scotland was said to be over 6,000; probably there were in reality between 7,000 and 8,000, of whom nearly 5,000 could be educated. The motion was cordially adopted and a vote of thanks was given to the Lord Provost for presiding.

CENTRAL MIDWIVES BOARD.

At the meeting of the Central Midwives Board for Scotland held for the election of office-bearers, Dr. James Haig Ferguson was unanimously re-elected chairman, Dr. Michael Dewar deputy chairman, and Sir Archibald Buchan-Hepburn, Bt., convener of the finance committee. The meeting appointed other committees and examiners, and approved the list of recognized institutions, with the teachers attached thereto, for the training of midwifery nurses.

CHALMERS HOSPITAL: ANNUAL REPORT.

The report by the Directors of the Chalmers Hospital, Edinburgh, shows that the number of patients treated in the wards during the year was 673 and the number of out-door patients 2,541. On the balance between the ordinary income and ordinary expenditure there was a deficit of £709 2s. 7d. and an extraordinary expenditure of £332 11s., which made a total excess of expenditure over income of £1,041 13s. 7d. For the current year the directors would require to use the whole free income of the trust for 1925, and they further sought authority to draw upon the funds of the trust to an extent not exceeding £600 if they should find it necessary to do so.

[The continuation of the evidence before the Committee appointed to inquire into the inadequacy of the hospital services in Scotland is printed at page 316.]

Correspondence.

CANCER OF THE OESOPHAGUS.

SIR,—Dr. Hill is, of course, quite right in his opinion (January 31st, p. 238) that there is a stage in the tortuous cicatricial variety of malignant disease in the upper third of the oesophagus where it may be impossible to insert a tube. This was in my mind when I made the remark regarding gastrostomy, knowing well the difficulty sometimes encountered. There is a stage, however, in all such cases where the obstruction can be overcome, so that given this point the statement would still hold good. The moral is that advice should be sought earlier. With regard to the lower end, there are difficulties, as Dr. Hill points out, owing to the contraction of the diaphragm and the irregularity of the growth; moreover, there is the liability of the tube being rejected on vomiting. Nevertheless, a considerable number of such cases can be successfully managed by a short tube, and, if not, by a long one. I have recently had under my care a man who wore at intervals a short tube over a period of eighteen months, and Dr. Stebbing showed me a man who had retained a short tube for several weeks. As I pointed out some years ago, these lower end obstructions can usually be traversed by a coudé bougie, or feeding tube when the straight variety cannot be passed. Once such a tube can be passed and retained for three or four days, then the thin-walled rubber tube carrying the silver wire suggested by Dr. Hill can easily be inserted and worn indefinitely.

Recent experience has certainly led me to the conclusion that these low obstructions are more amenable to relief by tubage than I was at one time disposed to think.

Mr. Souttar has undoubtedly brought forward an additional and valuable aid in the treatment of cancer of the oesophagus. Further experience will give this variety of tube its right place. Its employment will be restricted to those who are familiar with the oesophagoscope, and this will set a limit to its application. On the other hand, the elastic tube can be introduced after a little experience, and has been used somewhat extensively by a number of surgeons. All short tubes fail when there is perforation into the bronchus, lung, or mediastinum, as fluids cause

irritation. When this stage is reached the long rubber tube —first introduced by Mr. James Berry—must be employed. There are many other questions arising out of the subject which space will not permit me to touch upon. I may refer to my paper published in the *Lancet* for March 30th and April 6th, 1889.—I am, etc.,

London, Feb. 9th. CHARTERS J. SYMONDS.

LONG FREEDOM FROM RECURRENCE AFTER OPERATION FOR CANCER OF THE BREAST.

SIR,—The case published by Mr. Steward, of the woman who had a recurrence thirty-one years after her original operation for cancer of the breast (January 24th, p. 156), has elicited interesting remarks from Sir Anthony Bowlby and Drs. Manson and Brown. This case displaces that recorded by Verneuil in *La Semaine Médicale*, 1888, 112, of a woman on whom he operated again for recurrence thirty years after the original operation, which hitherto was the longest recorded interval. Verneuil's patient lived, but for how long is not stated. Bryant had a twenty-five year interval, with the further curious connexion that the patient had had the cancer for five years before the first operation; the daughter had cancer in her breast but died in six months from the time of her operation. All these three cases, therefore, were more than thirty years from the commencement of the disease.

Mr. Steward and Dr. Manson refer to the cause of the condition being general and not local. I should like to point out, however, that this conclusion is not warranted. Cancer always is local and can only grow where cancer cells exist, and cancer cells start in organs in which there is epithelium, and may be carried to other regions, but they are always local. A general tendency, whatever that means, can never produce cancer in the subcutaneous tissues if cancer cells have not been brought there.

The position of the recurrences a little way from the scar is one of the commonest sites, after the axilla, for recurrences to appear. It is due to the fact that at the operation the knife is kept close to the skin for what is hoped is a sufficient distance, and is then turned deeply through the tissues; in doing this it cuts across the lymphatics and cancer cells escape and remain behind. Many of these cells doubtless die, but some survive and produce recurrences at various times later. In this case there were at least four cells surviving, all of which escaped at the same time, and lay about the same distance from the scar; other cells had already been carried to the internal organ and lay dormant there. How long cells live is unknown; it is only with the greatest difficulty that we can ever find karyokinetic figures in the cells of a constantly changing tissue like the skin, and we must suppose that some cells such as those in the anterior horn of the spinal column, which send their axons to the muscles, must last throughout our lives, as it is almost impossible to imagine that they can ever be replaced. There is no reason to suppose that tumour cells should be less hardy. The answer to the question why they do not grow at once, we must suppose, is that there is a body resistance which prevents them growing, and this resistance varies in different individuals. It is this resistance, or lack of resistance, which determines whether a person has atrophic or acute cancer. This resistance may be very strong for a time, but in almost all cases, if the patient lives long enough, it weakens and disappears and lets the disease work its will, and lucky are those people who, "cured of cancer," die of intercurrent disease in the meantime. In Mr. Steward's case there were apparently internal metastases which proved fatal. The most extraordinary example ever published of this resistance giving way is the case recorded by Crivelli and Tinca; the woman lived with a carcinomatous growth of the breast for forty-seven years, and it was only during the last two years that the resistance broke down and the disease obtained the mastery.

These long intervals between operation and recurrences are very interesting, but what is equally interesting, and even more important for us to know, is the longest period a person has lived after operation for cancer without having a recurrence, and of this no one has any figures.—I am, etc.,

London, W., Feb. 2nd. DUNCAN C. L. FITZWILLIAMS.

A VASCULAR SIGN OF DEATH.

SIR,—In the *Epitome* for January 24th, 1925 (No. 79), reference is made to Dr. M. H. Kahn's claim (*Amer. Journ. Med. Sci.*, December, 1924, p. 890) that segmentation of the venules and arterioles has not hitherto been described as a clinical sign of death.

I was taught this sign at St. Bartholomew's Hospital twenty-five years ago, and on one occasion (when ophthalmic house-surgeon) was examining the retina of a patient with the ophthalmoscope at the moment of death. The column of blood in the veins appeared to stand still, then shake into broken segments. After oscillating to and fro for an immeasurably short period the broken segments came to rest.

Bouchut's description (quoted in Norris and Oliver's *System of Diseases of the Eye*, Lippincott, 1900, vol. iv, p. 917) of "the interruption of the blood current in the retinal veins . . . recognized by a pneumatosis which at times exists in the meningeal veins" cannot be improved upon.

I think this is the appearance to which Dr. Kahn refers when he says that segmentation of the venules and arterioles is a definite sign of death.

The fact was established by Bouchut in 1876, and several references were made to the phenomenon in the BRITISH MEDICAL JOURNAL during 1924 (March 8th, p. 424; March 15th, p. 497).—I am, etc.,

Clifton, Bristol, Jan. 29th. J. A. NIXON.

IODIZED TABLE SALT.

SIR,—The note in your issue of February 7th (p. 274) on this subject calls for a few remarks. There is abundant evidence to prove that vast numbers of people in this and other countries suffer from a deficiency of iodine in their diet. The late Dr. Barwise stated in a newspaper interview that 10 per cent. of the natives of Derbyshire have goitre. If he meant that 70,000 persons in this county have a visible enlargement of the thyroid gland I think there is an element of exaggeration in the statement. Undoubtedly, however, a far larger number suffer in some degree from hypothyroidism (with or without goitre) as the result of partial iodine starvation. Goitre is the result of extreme shortage: minor indications of the defect must be sought elsewhere.

The problem, as you observe, is how to supply the community with the small quantity of iodine they so badly need; and salt as a suitable medium has much to commend it. The amount of iodine appears to be the chief difficulty, and only time and experience can settle the point. I accept Marine's estimate that the body requires 2 grains of iodine a year; but I differ when you proceed to draw from that statement the conclusion that "Any method of giving iodine as a preventive of goitre should therefore aim at providing about 2 grains a year." This assumes that all our iodine intake is to be derived exclusively from iodized salt, which in this country is impossible. Iodine is so widely distributed throughout nature, although present only in minute amounts, that we cannot, not even in goitrous Derbyshire, avoid getting some in our food and drink. The iodine we obtain from iodized salt is intended only to supplement what we get elsewhere; and there is reason to believe that, small though the amount be, if taken regularly from early childhood, it will achieve the end in view.

I have been mainly responsible in advising in an honorary capacity the firms that have marketed iodized salt in this country, and the following points have received consideration in fixing the iodine content:

1. Iodized salt is intended not for treatment, but for prophylaxis only.

2. Once a salt of this kind is put on the market it is impossible to limit its use to goitrous districts. The only prudent course, therefore, is to have the iodine content so low that it can be used without harm, and probably with benefit, by everyone in all parts of the country, leaving supplementary measures, if experience shows them to be necessary, to be employed in those districts where goitre is exceptionally prevalent and severe. In some of the Derbyshire schools an iodized sweet or a chocolate Idiostarin tablet is administered weekly to the children whose parents have consented. Similar auxiliary methods are employed in Switzerland, Austria, and New Zealand: but it is very probable when

iodized salt is universally used from early childhood onwards the need for these supplementary measures will disappear. Time alone can settle the point.

3. Obviously in a new venture of this kind it is better to begin low, and gradually increase the amount if necessary, than to start with a high iodine content, meet with trouble, and bring the whole method into disgrace. It should be remembered that Chatin in Switzerland seventy years ago advocated the use of iodine as a prophylactic for goitre, and the method was very generally used at one time, but it fell into disfavour partly because excessive doses of iodine were employed, but chiefly because the exophthalmic bogy was paraded in a scaremongering fashion, as it will be again. Let us profit by the mistakes of the past.

4. It would be folly, in fixing the iodine content of this salt, not to take advantage of the experience of other countries, Switzerland, Austria, New Zealand, and even "God's own country"—the land where everything is done on a gigantic scale. The Swiss Goitre Commission, after painstaking investigations, fixed the maximum strength about 1 part iodine to 200,000 parts salt, and that is the proportion that has been adopted in this country, except in cases where the salt is intended to be used only at the table, when a strength of 1 in 50,000 has been advised. I am pleased that the Government of New Zealand, in the official instructions it has issued for the preparation of iodized salt, has followed the lead of Switzerland, Austria, and this country rather than of America. The strength it has adopted is 1 in 250,000. A special salt with a strength of 1 in 100,000 is permitted, but it must bear a label "Medicated salt," and it must only be used under medical advice.

A much greater proportion of iodine is used in the American iodized salts. Marine says that a concentration of 1 in 500 should be employed in mildly goitrous districts. Surely this is more in the nature of a medicinal preparation than a condiment. It is a hundred times stronger than our table salt, and it contains more than ten thousand times the amount of iodine we would get if we used natural sea-salt for culinary purposes.

Some time ago I asked the Ministry of Health to do what the New Zealand Government has done, and issue instructions or, at least, recommendations, for the guidance of our salt manufacturers. The matter is under consideration. Sir George Newman is, I believe, busy making an exhaustive study of this subject from the material he collected last year from all parts of the country, and his report is eagerly awaited.

My own opinion is that the strongest American iodized salt is perfectly harmless, and that the fear of producing Graves's disease by the use of iodine is quite groundless. In time it may be necessary to increase the iodine content of the salt manufactured in this country; but it is important to note that highly satisfactory results are being obtained in Switzerland and Austria by these weak preparations: and if a small quantity will do what we require, why use more? No one need fear to use freely the British iodized salts. It may be in very bad goitrous regions further iodine assistance may be required; but of no substance can it more truly be said that, however small the amount we receive, every little helps.—I am, etc.,

Chesterfield, Feb. 7th. J. A. GOODFELLOW.

ISOLATION HOSPITALS FOR SCARLET FEVER.

SIR,—A long experience of isolation hospitals, at any rate of those erected in the provinces according to designs approved by the Local Government Board, has convinced me that the designers overlooked one important point—namely, the provision of a covered and wind-protected space for exercise in the open air by convalescents from scarlet fever. In all other respects these modern isolation hospitals are admirable: the sites well chosen; ample air space in the wards; lighting, warming, and ventilation all excellent. But still we find periodical outbreaks of cervical adenitis, otorrhœa, nephritis, etc., which at one time I was inclined to associate almost entirely with temporary crowding of wards, and to deal with accordingly. Later experience has led me to modify these views, and I now think that one of the weak administrative points of these hospitals, if not a direct cause of complications, is the absence of well protected exercising space. In most of these hospitals the wards have been built on hitherto virgin soil, and the immediate surrounding of the wards is newly laid grass with gravel paths on which there is no great amount of regular traffic. In a wet season, such as the summer and autumn of last year, the difficulty of providing open-air exercise for children recovering from scarlet fever became very apparent. It was almost impossible to send the children out without sending them into damp slushy paths and lawns.

The point was emphasized a few years ago when a new phthisis pavilion was added to the hospital buildings in the joint hospital with which I am connected at Hill Top, Bromsgrove. In this pavilion a deep covered verandah is provided along the whole front of each block of cubicles; its advantage is obvious in wet weather. If such a covered space had been available in the scarlet fever and diphtheria blocks I am convinced that some of the complications with which we have been troubled during the last nine months might have been avoided. I am bringing this matter before the committee, but shall be very grateful if others will give their opinion. The additions I advocate would, of course, be rather expensive, but I cannot help thinking that the cost would be justified.—I am, etc.,

February 8th. H. CAMERON KIDD, M.O.H. Bromsgrove.

HEART STRAIN.

SIR,—Dr. Pullar's comments (January 31st, p. 238) on comparing a leaking aortic valve with the Bramah press are quite reasonable, and one would expect to find that the slighter the leak the more serious the effect on the wall of the ventricle. I believe that this would be so were it not for the other very important consideration—namely, the degree of the nourishment of the heart muscle. The slighter the leak, as a rule, the better this is, the more able is the heart to compensate well for the extra work thrown on it, and the greater the danger of overlooking early aortic incompetence. With free regurgitation there is very little power of drive through the coronary arteries, and the heart muscle fails badly in consequence of the diminished blood supply to it. The analogy of the effect of the force generated by a leaking aortic valve and that applied in a Bramah press can only be partial, because the wall of the press is absolutely rigid, whilst that of the ventricle is elastic, but it is a convenient reminder of the danger of aortic incompetence.—I am, etc.,

Manchester, Feb. 7th. E. M. BROCKBANK.

WHOLE-TIME MEDICAL OFFICERS.

SIR,—Two letters which appeared in the BRITISH MEDICAL JOURNAL of February 7th may, with advantage, be placed side by side and compared. One is from Dr. Crossley, a senior tuberculosis officer, and will be found at page 58 of the SUPPLEMENT; the other, from Dr. Naish, physician, Sheffield Royal Hospital, at page 283 of the JOURNAL.

Dr. Crossley: "We whole-time medical officers . . . are all, or nearly all, members of the British Medical Association, and are entitled to as much consideration as any other members, and to as much freedom of action in our choice as to what branch of the profession we wish to follow."

Dr. Naish: "If all men were obliged to choose their career immediately upon qualification, there is little doubt, I think, that the resident hospital posts would be given by preference, and rightly so, to those whose choice was private practice as against public services."

Here we have a physician to a great teaching hospital and lecturer in medicine to a medical school approving of discrimination against newly qualified medical men who intended to enter the public services. In the service to which—although no longer on the active list—I still have the honour to belong, young officers, on admission, can be seconded for twelve months for the purpose of holding resident hospital appointments before taking up their work in India. Apparently, these men need not waste time in applying at Sheffield. In the last three generations of my family there have been seven doctors. Of these, two joined the Indian Medical Service, two the R.A.M.C., one the Royal Navy, one is a county tuberculosis officer, and only one elected to "reap the golden harvest"—as Dr. Naish puts it—of private work. As far as I know, we have all held resident hospital appointments.

It would help to clear the air if the British Medical Association would disavow, and as soon as possible, the policy which Dr. Naish proclaims. It should be frankly recognized that there is room for the medical official and the private practitioner. The part of the draft Memorandum of Evidence for the Royal Commission on Insurance that deals with "specialist services" embodies an attack upon the salaried clinical medical officer, and needs entire recasting. The clinic system, and the "team work"

which clinics imply, are now essential parts of the practice of medicine throughout the world. While every officer in charge of a clinic will welcome the association of private practitioners with him in his work, he will naturally resent any attempt to oust him from his appointment and take over the fruits of his labours; and the modifications which the Memorandum suggests are all in the direction of reducing the usefulness and lowering the standard of work at the clinics—a retrograde step which, I believe, the public will not tolerate.—I am, etc.,

P. HEFFERNAN, Major I.M.S.(ret.),
Tuberculosis Officer, Derbyshire County Council.

Buxton, Feb. 7th.

IMMUNIZATION AGAINST TUBERCULOSIS.

SIR,—There has been much publicity lately on the subject of immunization, more particularly immunization of calves against tuberculosis. In France Dr. Guérin has been using a vaccine made from attenuated cultures. In England Dr. Nathan Raw and Mr. Payne have published results with the use of vaccine R, also from an attenuated culture. The French observers indicate that immunity is not established for more than two years, as a rule. Dr. Raw and Mr. Payne do not yet indicate how long the immunity will last. Dr. Orr of the Rowlett Institute, Aberdeen, in a recent article in the *Transactions* of the Highland Society, indicates that his opinion is that the replenishment of the depletion of the milking cow is the crux of the matter. The Pickett-Thomson Research Laboratory has recently made certain researches in this matter. The writer is one of those engaged in this research. We have attempted immunization at all periods from birth till 1 year old. The matter has been approached from the standpoint of biochemistry, in consequence of the researches of Dr. David Thomson.

We find that all fractions of the tubercle bacillus help to confer immunity, although some are more powerful than others. We find that the length of the immunity depends on the condition of the mother at the time of calving. If the cow is depleted immunity will last for a shorter time, in a calf treated at 6 months old about one year. The earlier the treatment the longer the immunity. Calves from cows with a big milk yield and a big percentage of fat are more apt to have a shorter immunity.

Our results appear similar to those of Dr. Raw and Mr. Payne, but we believe that calves from cows markedly positive to the eye test require more than two doses of vaccine. Our results are at variance with those of Dr. Guérin when he advocates yearly vaccination. We find that if a calf has not a lasting immunity, immunization by the use of vaccine in a sensitive animal may be dangerous. I refer in this instance to animals which remain sensitive from 9 months till 2 years. There is not the same danger in older cattle.

Our researches would almost make us agree with Baumgarten in that it looks as if the virus is in some cases transmitted from the mother. Thus we turned our attention to an attempt to immunize pre-natally. We find that by using the most powerful fraction of the bacillus alone we could render a milking cow which was positive to the eye test negative in about three months. The process was accompanied by great improvement in health, appearance, and milk yield.

The first cow we treated doubled her milk yield in the yearly lactation period. In another cow, aged 10½, markedly depleted and apparently finished, after treatment increased her milk yield from 1,500 gallons to 2,100, and gave birth to twin calves which were all that could be desired. About a dozen cows were so treated. The eye test, it is necessary to note, did not remain negative, but was only positive for a few hours after dropping tuberculin in the eye. The calves of these cows have thriven better, and, we believe, will be easily immunized.

Our complete results indicate that immunization is perfectly feasible. We are at present devising a method of rectifying the negative mineral balance which deep milking cows undergo. Those researches appear similar to the early researches of Sir John McFadyean, who used live human bacilli. We have used a colloidal solution of live human bacilli. We believe, with Dr. Orr, that the better treatment of depletion is the crux of the matter. From depletion comes tuberculosis. Our researches indicate that where depletion is going on, even when not noticeable in the mother, the calf will show it before the mother breaks down or reacts to the test. If this be true, then early vaccination is imperative if tuberculosis is to be controlled.

In reference to the recent criticism of the detoxication methods of Dr. David Thomson and the defatting method of Professor Dreyer by Dr. L. S. P. Davidson of Edinburgh, it is only fair to recognize that Dr. Davidson himself stressed the fact that he was experimenting with *in vitro* immunity reactions.

I take it that a satisfactory vaccine is one which renders insensitive a very sensitive animal. It enables immunization to take place in an animal sensitive even to the protein and fats of food. In our experiments we attempted immunization of a reacting bull calf at 8 months—mother a reactor; father, history of tubercle probable. We used the fatty fraction of the bacillus, and caused an acute spread of the disease. In the next calf—same mother, same father—we used detoxicated vaccine at birth, later one dose fatty fraction. The second calf passed the test at 8 months and is one of the best heifers in the herd. In our experience, in an animal at 6 months or more, if sensitive and treated by the fatty fraction alone, a spread even to the meninges may occur.

In immunization of cattle heat-killed bacillary emulsions in saline are not good because of the increased sensitiveness. No doubt heat-killed vaccines increase agglutination and complement fixation, but the ultimate aim of immunization is to preserve the integrity of the blood plasma; for the criteria of *plus* agglutinins, etc., are associated with a diminution in the coagulability of the blood. Heat-killed vaccines against infectious pneumonia of calves in the United States of America are an utter failure if given after the disease commences. In this older, more experienced land the farmers save the herds by early bleeding and limiting the extent of the pneumonia.

It would interest those who entertain a belief in lipoid that the farmers in Yorkshire are in the habit of making a wound and placing therein a piece of bacon fat when the animal is wasting. The result is usually most successful. But it is only fair to note that the lipoid of bacon fat contains a low grade vitamin A, while the lipoid fraction of the tubercle bacillus would appear to be vitamin A in great concentration. That the lipoid fraction has its place there is no doubt, but not for the young, sensitive consumptive we have to treat. Professor Dreyer is justified in withholding the lipoid from his vaccine.

Lastly, in support of the contention that immunity is a matter of biochemistry, I would record that in calves from deeply milking cows where depletion has gone on, milk appears to be, as a feeding stuff, almost poisonous. I learnt that many feeders had known of this for a very long time. We found that in calves desensitized from birth this poisonous character of milk is prevented. Milk in sensitive calves appeared to spread the disease.

That there is a close resemblance chemically between the tubercle bacillus and its products and milk has been recognized in Germany before now, and I think that these researches, given in a tentative way, indicate that there is some close alliance. There is great necessity for research workers in laboratories refraining from expressing results from laboratory animals in terms which have no bearing on disease as seen in practice.—I am, etc.,

J. J. THOMSON.
Chief Clinical Tuberculosis Officer, North Riding of Yorks.

Northallerton, Jan. 14th.

SHAVING THE VULVA.

SIR,—Will you allow another general practitioner to offer some remarks on the shaving of the vulva before labour?

I offer no opinion on its efficacy in preventing infection; what I am concerned with is its practicability in general practice. It certainly cannot be done by the doctor. It is scarcely reasonable to expect any young woman to submit to such a process at the hands of her medical attendant.

It must be done by the nurses, and how many of them are thoroughly skilled in the work? To remove every hair from the vulva and adjacent parts is a difficult process. Whatever tools are used there will inevitably result a number of more or less minute cuts and abrasions. These are not likely to lessen the risk of infection during childbed.—I am, etc.,

London, E.12, Feb. 7th. A. CAMPBELL STARK.

THE MALIGNANT CELL.

SIR,—The critical analysis of Carrel's latest work given in the BRITISH MEDICAL JOURNAL of February 7th is of such outstanding importance that I ask your permission to comment on the distinction made between sarcoma and granuloma. With the utmost respect and with equal confidence I say that no such difference exists in nature.

A typical human alveolar sarcoma proved to be a granuloma on making a full histological analysis, as is recorded in *Protozoa and Disease*, Part II, Chapter xii; and in the next chapter of the same book a human round-cell sarcoma is shown also to be a granuloma.—I am, etc.,

London, N.W.8, Feb. 8th. J. JACKSON CLARKE.

TUBERCULOSIS INCIDENCE AND CLIMATE IN INDIA.

SIR,—I have read the able paper by Sir Leonard Rogers, published last week (p. 256), with the greatest interest and pleasure. The unusually reliable material and wealth of meteorological data, the great area, and the great numbers dealt with, the marked climatic contrasts, and, above all, the high authority of the writer—for there is no greater name in contemporary medicine—make such a confirmation of the utmost consequence to my work. I especially welcome this confirmation at the present moment, when the attention of the profession seems at last really to be turning to the subject.—I am, etc.,

Exeter, Feb. 8th. W. GORDON.

Medical Notes in Parliament.

[FROM OUR PARLIAMENTARY CORRESPONDENT.]

Reassembly of Parliament.

THE House of Commons reassembled on Tuesday, February 10th. The business of the week included Supplementary Estimates presented by the Ministry of Health. As a grant in aid of payments for medical benefit in England £300,000 was asked, and for medical benefit in Wales £17,000. These additional sums were needed to meet expenditure under the National Health Insurance (Cost of Medical Benefit) Act, 1924. For the additional sickness benefits required "in consequence of heavy sickness in the spring of 1924," £330,000 was asked for England and £3,500 for Wales.

The Ministry of Health is not expected to introduce any medical legislation for England and Wales this session, but the Scottish Board of Health will probably reintroduce the Insulin Bill, to authorize the provision of insulin by public authorities in Scotland.

Colonel Fremantle (U., St. Albans) has been elected Chairman and Dr. E. Graham Little (Ind., London University) Secretary of the Medical Committee of the House of Commons.

The Services.

DEATHS IN THE SERVICES.

Major Donald Hector Colin MacArthur, O.B.E., R.A.M.C., was accidentally killed at Meerut on January 23rd. He was born on December 19th, 1880, and educated at Edinburgh, where he graduated M.B. and Ch.B. in 1905 and M.D. in 1913. After filling the post of senior house-surgeon of the Clayton Hospital, Wakefield, he entered the R.A.M.C. as lieutenant on August 1st, 1908, and attained the rank of major after twelve years' service.

Brigade Surgeon Francis Collins, K.A.M.C.(ret.), died at Lyme Regis on February 3rd, aged 92. He was born at Knaresborough and educated at Edinburgh, where he took the L.R.C.S. in 1854, and graduated M.D. in 1864. He entered the army as assistant surgeon on September 1st, 1854, became surgeon on March 9th, 1867, and surgeon major in 1873; he retired with a step of honorary rank on January 7th, 1880. In the regimental days he served in the 5th Foot, or Northumberland Fusiliers, and in the 18th Dragoons, and in 1860 was appointed to the Royal Military College, Sandhurst, where he served for several years. He was one of the last survivors of the Indian Mutiny; he took part in the second relief of Lucknow, including the attacks on the Dilkusha and La Martinière, and in the occupation and siege of the Alambagh, also in the final relief and capture of Lucknow, receiving the Mutiny medal with two clasps. After his retirement he interested himself in archaeology, contributing many papers to the publications of the Yorkshire Archaeological Society and Surtees Society.

Medico-Legal.

REX v. BATEMAN.

PROCEEDINGS IN THE COURT OF CRIMINAL APPEAL.

IN the Court of Criminal Appeal on February 9th the appeal of Dr. Percy Bateman, of New Cross Road, London, against his conviction for manslaughter at the Central Criminal Court on December 12th, was heard before the Lord Chief Justice (Lord Hewart), Mr. Justice Salter, and Mr. Justice Fraser.

Mr. Norman Birkett, K.C., and Mr. Arthur H. Davis appeared for the appellant, and Mr. H. D. Roome for the Director of Public Prosecutions. The court was crowded.

The Case for the Appellant.

Mr. Birkett briefly summarized the history of the case on the lines of the opening of his speech on the original application, as reported in our last issue (p. 285). He remarked that, according to Dr. Bateman, the presentation in this labour was the most difficult known to medical science. The head, the feet, and the cord were all presenting together. He complained that Mr. Justice Shearman, in his summing up, had referred to the placenta as "membranous stuff," which might have misled the jury. The placenta was actually a thick, fleshy, cake-like substance, a span in breadth, an inch in thickness, and a pound in weight. Continuing, he said that two allegations were made against the appellant, one relating to his conduct of the operation of version and producing the child, and the other to his action in the events which followed thereon. It appeared from the *post-mortem* examination that the injuries which the woman sustained at that time, as described by the medical witnesses for the prosecution, were the destruction of the pelvic floor; the uterus, with the right Fallopian tube and the right ovary, had been removed with the placenta; there was a tear of 2 inches in the uppermost part of the bladder, and there was a crushing of certain intestines against the sacral promontory. There was also a slight tear in the rectum. It was alleged at the trial that some of these injuries might have been caused by natural labour. The expert witnesses stated that the injuries might have been so caused, but that more probably they were the result of the manual traction. Counsel then recapitulated the circumstances which followed the labour, up to the death of the woman seven days later. It was said for the prosecution that the fact that this injury took place at delivery was in itself evidence of such negligence that the jury, on being satisfied that it had taken place, might convict of manslaughter; and that, following these injuries, the omission to do anything with a view to remedying the state of affairs which had resulted was negligence of a kind which rendered a person liable to conviction on the same charge. The answer of the defence was that there was not negligence, and that in so far as the first of these allegations was concerned no single act of negligence was even brought forward by the prosecution, while so far as the second allegation was concerned the conduct which was said by the prosecution to be negligent was, in fact, considered conduct, and, the defence submitted, proper and prudent conduct. Of three cases cited in which the uterus had been removed in a similar manner, one patient died within thirty minutes of such removal, the second died on the way to the hospital, and the third died within forty minutes of admission. The woman in this case lived for seven days.

Mr. Justice Salter desired to know whether negligence was alleged in the manipulation which went on for one hour before the birth of the child.

Mr. Birkett said that this was certainly not admitted by the defence, and it was a matter of some conjecture whether it was persisted in by the prosecution. Sir Bernard Spilsbury had admitted that there was nothing unusual in manipulation for an hour, as in this case, to effect delivery. Counsel then went on to read portions of Mr. Justice Shearman's summing up, and pointed out that there was not one word which made any distinction whatever between what might be termed civil negligence and criminal negligence, although this was a factor of supreme importance in the case. The summing up might be quite unexceptionable in an action for damages against a doctor, but in a direction to a jury on a criminal charge the omission he had pointed out was fundamental. He was conscious of the technical difficulties arising on the distinction between civil and criminal negligence; both things were proved by the same facts, and juries drew inferences from the facts; but unless the clear distinction was made, and the ground of it made, a great injustice could be done. Civil negligence was that negligence in which reparation was sought by the individual: in criminal negligence reparation was sought by the State. In all the discussion with the jury as to the elements which constituted this alleged crime, not one word was said to indicate the distinction between the case in which there was an action for damages and in which the question of degree of skill might enter, and the case in which a person was indicted on

the criminal charge of manslaughter. He appreciated how frail might be the margin between civil and criminal negligence, but in a case like this the sympathies of the jury would obviously be with the husband and with the dead woman, and this made it all the more important to point out that in this case those considerations which might properly be brought to bear in an action for civil damages should not apply. It was a fundamental misdirection to say to a jury that in a criminal charge they could only convict if in their judgement the standard of skill exhibited fell below that which any doctor should possess. In his submission this had no relation to crime at all, although it was entirely admissible in a civil action.

The Lord Chief Justice: There is an implied undertaking of reasonable and competent skill and an obligation to exhibit that skill in fact. You must not say that a doctor who holds himself out to do a doctor's work is negligent because his skill falls short of the highest skill; you can only say that he is negligent in this sense if his skill is not such as it is reasonable to expect of a practitioner.

Mr. Justice Salter: Take a case where there is gross lack of skill, but no lack of care at all. Suppose an unqualified person performs an operation and kills the patient. It is admitted that he did his utmost, used every faculty he had, but could he not be convicted of manslaughter?

Mr. Birkett replied that it would depend on the facts of the case. If his patient knew his lack of qualification and still went to him, the practitioner could not be convicted. Their lordships would remember a case where a man went to a farrier for some operation, and the answer was that if the patient "had not been an ass" he would not have gone to a farrier; and there was no felony. He submitted that in dealing with the crime of negligence to speak of degrees of skill was quite irrelevant.

The Lord Chief Justice: If a person puts himself out as qualified to perform a difficult and delicate operation, he is not, on this argument, to be judged as regards skill by any objective test, but by such skill as in a particular case he happens to have.

Mr. Birkett answered that he appreciated many intellectual difficulties about this matter, but the degree of care and skill which formed the standard whereby the jury must judge—both in civil and in criminal cases, of course—must depend in some degree upon the person with whom they were dealing. If they were dealing with a Harley Street specialist different standards would apply from those which should be taken in the case of an ordinary general practitioner.

The Lord Chief Justice: Do you or do you not assert as a principle of law that under the head of skill the practitioner is to be judged, not by reference to a general standard of skill, but by reference only to such skill as he had shown in a particular case?

Mr. Birkett said that he submitted the latter. He went on to quote from Bevan *On Negligence* to the effect that negligence in one man might be competent care in another, and that where the charge was one of negligent treatment the question of competency or incompetency was irrelevant.

Mr. Justice Fraser pointed out that the passage quoted from Bevan went on to declare that the evidence of negligence was not suggested by an arbitrary standard. Given the presumptive competency of the practitioner, the standard of skill required of him, according to this authority, was that of the branch or school to which he belonged.

Mr. Birkett said again that his submission was that this would be perfectly applicable where the issue was one of civil liability, but was not applicable where the issue was one of crime.

Mr. Justice Salter: You agree that in civil matters a man who does his very best may be liable because he is incompetent. Is it contended that in criminal matters a man who has admittedly done his utmost, but is incompetent, is not liable?

Mr. Birkett said that this, without hesitation, was what he would contend. He based his argument for a difference between the two issues on the fact that in the one case—the civil case—the reparation was to the individual, and in the other case—the criminal case—the reparation was to the State, which had suffered injury. There was no injury to the State if a man had done the very best he could.

The Lord Chief Justice: Is there no injury to the State—I am not thinking of this case—if a person, being unskilled, undertakes an operation requiring skill?

Mr. Birkett: Let me take the case of a quack. The quack holds himself out as being able to do certain things and to provide proper treatment, and, knowing he does not possess the skill, he deceives people by so doing. That clearly would be a case where it would be to the interest of the State to say that this was a crime. But where you have a fully qualified medical man doing that which by law he is authorized and required to do, the mere fact that he may fall below the standard of skill in some respect has no reference to a crime, though it may have a reference to civil liability.

The Lord Chief Justice: The lack of the proper quantum of skill or lack of proper diligence in act would not be sufficient to convict. Juries must also be satisfied that by reason of that lack in the one case or the other, or both, the death of the patient was caused or accelerated.

Mr. Birkett: The real question for the jury would have been this: On these facts is there evidence of gross and culpable negligence which entitles you to say that this man is guilty of manslaughter? That is the question, not the refinements of degrees of skill nor the highly contested medical questions of proper treatment.

Counsel then referred to the case of Rex *v.* Van Butchell, an indictment of manslaughter following upon treatment for disease of the rectum. In the judgement it was stated:

> "If a person, bona fide and honestly exercising his best skill to cure a patient, performs an operation which causes the patient's death, he is not guilty of manslaughter; and it makes no difference whether such person is a regular surgeon or not, nor whether he has had regular medical education or not."

He also referred to Lord Ellenborough's judgement in the Williamson case [set out in the report of his speech in our last issue], and pointed out that nothing was said in Lord Ellenborough's judgement in that case with regard to standard of skill. It was put quite clearly in that judgement that, to convict for manslaughter, either gross ignorance or criminal inattention must be proved. In reply to Mr. Justice Salter, counsel agreed that if a man held himself out to be a skilled man when in fact he was a quack, he could be convicted of manslaughter for pretending to have that skill.

Mr. Justice Salter instanced the parallel case of a motor-driver who, although he might take the utmost care, would not thereby be saved from a charge of manslaughter should he be incapable of proper driving. Mr. Birkett said that the conviction in that case would be on the ground that he purported to have skill as a driver when in fact he had not, but it would not be a question of his standard of skill as compared with other motor-drivers. In the case of a skilled motor-driver the question for the jury would be, not whether in this instance he fell below the general standard of skill of motor-drivers, but whether, with the skill he had, he was negligent on that particular occasion. His degree of skill or the difference between his skill and that of other drivers would be quite irrelevant.

The Lord Chief Justice here referred to the case of Rex *v.* Spiller, in which the judge said:

> "Any person, whether a licensed medical practitioner or not, who deals with the life or health of any of His Majesty's subjects, is bound to have competent skill; and is bound to treat his or her patients with care, attention, and assiduity; and if a person dies for want of either, the person is guilty of manslaughter."

Mr. Birkett submitted that if a layman professed to be a medical man and undertook to cure people his action would belong to an entirely different category from that of a medical man who was doing that which he was ordinarily and customarily employed to do. The judgement in this case of Spiller went no further than that. It was not there a question as to the exact degree of skill, but as to whether the skill exhibited fell below the general standard of skill of such persons as the defendant in that case.

The Lord Chief Justice remarked that the Spiller case dated back to 1832. In 1864 Mr. Justice Wills, in the case of Reg. *v.* Markuss, said that any person who dealt with the health of others was bound to take reasonable care. Gross negligence, said the judge in that case, might be of two kinds. One was that of a physician who, for example, went hunting and left his patients untreated, and the other was that of a physician who was rash in, for example, dealing with dangerous medicines in which he was insufficiently skilled. The judgement continued:

> "An unskilled practitioner who ventures to prescribe dangerous medicines, of the use of which he is ignorant, shows culpable rashness for which he will be responsible."

There one had, said the Lord Chief Justice, the twofold division—on the one hand inattention, and on the other hand insufficient skill.

Mr. Birkett, in reply, again cited Bevan, to the effect that if a person assumed to act as a physician, however ignorant of medical science, and prescribed with an honest intention of curing the patient, but by ignorance the patient died, the person was not guilty of manslaughter or murder; but if the party prescribing administered the medicine with an obstinate wilful rashness, and not with an expectation of effecting a cure, he was guilty of manslaughter at least, though he might not have intended to effect any harm. To come back to his main contention, counsel said that when the jury were told, "You can only convict this man if you come to the conclusion that he removed the uterus from this woman because his degree of skill fell below that which you would expect of a doctor," it was, in his submission, a misdirection. He then went on to observe that the coroner's deposition which was used in the trial, and upon which Sir Bernard Spilsbury based his evidence, was never proved, and was wrongly admitted, to the injury and detriment of the appellant. Altogether (counsel continued) it appeared that there was no case to go to the jury so far as the operation itself—what he called the first part of the

charge—was concerned. The testimony of the midwife—who had had thirty-seven years' experience and had attended on an average 100 confinements a year—when she was asked whether the doctor did everything he ought to do for this woman, was "Yes, I thought so." It was said that he concealed from the relatives the fact that the uterus had been removed, that in a letter he had suggested that the uterus was merely introverted instead of saying it was removed, that in his original deposition before the coroner there was some variation from the facts placed before the criminal court, and that he had put unnecessary violence upon the placenta instead of "peeling" and "coaxing" it away. As for the charge of concealment from the relatives, let the circumstances be considered. This doctor found that the uterus had come away—a terrible calamity—and he told the husband that the woman was going to die, but was it not mere humanity on his part not to distress the family by particulars of what had happened? This humane reticence was now urged as an element of negligence.

The Lord Chief Justice: Not so much evidence of negligence as evidence throwing light on his state of mind with regard to what he had done.

Mr. Birkett said that the issue for the jury was not what he had done, but how he had done it, and the fact that he had concealed from the relatives what he had done could have no relevance. This could be used only to create prejudice. Upon this first head of the case, therefore—relating to what occurred at delivery—there was nothing to go to the jury. That, in his submission, was what the judge should have ruled, and then he might have asked the jury to consider whether the indictment was sustained by the second head—the subsequent action of the doctor. But to leave the issue at large, so that it was not known upon which part of the case the jury came to their conclusion, did entitle the appellant to come to this court to make his submission. In a civil case a defendant was entitled to know the particulars of the alleged negligence; but in the much more serious matter of a criminal charge—when to a medical man a conviction meant the loss of everything—the allegations were left at large.

The Lord Chief Justice: To take away the placenta is an easy matter. From the fact that a considerable amount of force had to be used in the taking away of the placenta it might be held that the doctor ought to have known that what he had got hold of was not the placenta. Was not the jury entitled to say that?

Mr. Birkett: I submit not. I appreciate the difficulties of precise definition.

The Lord Chief Justice: You used the term "coaxing" the placenta. Might not the jury have thought, after hearing the evidence, that there must be a very great difference between coaxing away the placenta and pulling away the womb?

Mr. Justice Salter pointed out that neither Sir Bernard Spilsbury nor Dr. Buchanan, who was the other medical witness for the Crown, was asked to say anything on this point.

Mr. Birkett said that the evidence of Sir B. Spilsbury was entirely in accord with that of the two eminent obstetricians called for the defence—namely, that the edge of the uterus being torn, thin, and irregular, as indeed was the edge of the placenta, to take hold of the one edge in mistake for the other was the most natural thing at that stage, and thus the uterus came away.

The Lord Chief Justice: You say it came away. The evidence is that it was pulled away with considerable force.

Mr. Birkett next dealt with the second portion of the charge—that relating to the subsequent events. The allegation was that because of what the doctor had done, whether through negligence or not, he had destroyed the pelvic floor, and his first duty, therefore, as a medical man was to repair the pelvic floor so as to prevent what the witnesses termed "herniation." The way to do this was by the operation of stitching. If that had been done it was urged that the patient's life might have been saved, and in any event the exploration for the purpose of the operation would have revealed the injury to the bladder and intestine. It was urged that from the evidence as to the woman's condition she was at some time after the birth in a condition to stand the operation, and it was also put forward that it was the doctor's duty to get a second opinion. Counsel contended, on the other hand, that the non-removal of the woman for operation was not a negligent thing at all, but a carefully considered medical procedure. To have moved the patient in the days directly following this event would have meant probably immediate death. There was no moment following delivery until the woman's actual removal five days later when that would have been a safe and proper thing to do. The necessity for drainage was put in cross-examination. Having regard to the removal of the uterus and the position in which the woman was placed, she had in fact the most effective natural drainage. Everything in the previous similar cases on record pointed against operation and in support of the very conduct which the appellant had followed. The point was made by Sir B. Spilsbury and Dr. Buchanan that, the uterus and ligaments having been torn away, certain blood vessels were torn at the same time, and that unless some stitching was done to deal with these blood vessels the woman was certain to die. The answer was that the bleeding stopped, and the evidence showed that the clotting was the natural and proper thing for stopping the bleeding. To leave her in the position in which she was left so that there might be some chance of healing before removal was not merely the most humane but the most prudent thing to do.

The Lord Chief Justice: The question is, can a professional man be found negligent for doing what two heads of the profession say they would have done in like circumstances?

Mr. Birkett: And it has to be remembered on the other side that Sir Bernard Spilsbury—for whom I have a very great respect—is not a gynaecologist, but a pathologist.

The Lord Chief Justice went on to say that the frequency or the rarity of such a dilemma had to be considered. Apparently the tearing away of the uterus was a very rare thing. Was a man to be expected to know that if that happened all risks must be taken and the patient must go to hospital? If it were an everyday occurrence it would be different.

Mr. Birkett agreed, and said that this was one of the substantial grounds on which he relied in his plea that there had been misdirection on the evidence. The learned judge had told the jury that that fact did not matter. It was vital to the defence to show that in this very rare occurrence the doctor had done everything that a practitioner ought to do. Sir B. Spilsbury, when asked when operation should have taken place, had said that it would depend upon the patient's condition, and that she should have been operated on as soon as she rallied from a state of collapse. For evidence as to the patient's subsequent condition Sir B. Spilsbury had relied upon statements made by the husband and other members of the family, and had entirely ignored the more skilled evidence of the midwife, who testified that there was no change in the patient from the time of delivery on July 23rd to her removal to the hospital on July 28th.

At this point the hearing was adjourned until the following day. When Mr. Birkett apologized for the length of his speech, the Lord Chief Justice begged him to take his time, in view of the very great importance of the case.

Tuesday, February 10th.

On the resumption of the hearing Mr. Birkett said that two matters only remained on which he had to trouble their lordships—misdirection by Mr. Justice Shearman on the evidence, and the plea that the verdict was against the weight of evidence. In the notice of appeal there were fourteen separate heads set out on which misdirection was alleged, but in general the only importance to be attached to these was in respect of their cumulative effect. One matter specially complained of was that the jury might have been led to believe, from the way in which the matter was dealt with by the learned judge, that the evidence for the defence given by Dr. Banister as to the number of similar cases of the coming away of the uterus was of no account. With a lay jury, shocked no doubt by the circumstances of this case, there was need for very careful direction if they were not to be led away by their feelings to the disadvantage of the appellant, and they might easily have believed that the pulling away of the uterus was in any circumstances a grossly negligent thing.

The Lord Chief Justice remarked that it might well be, without any question of negligence, that a doctor would pull at the edge of a torn uterus believing it to be the placenta, but the jury might have considered that the degree of force necessary would have informed him, before matters had gone too far, that he was not trying to remove merely the placenta. His lordship asked further whether it was not legitimate for the jury to say that here was a healthy woman, the mother of four children already, and that it was by some mishandling on the part of the doctor in delivering the child that the uterus was pulled away. Mr. Birkett submitted that that was not legitimate. He complained that the summing up might have led the jury to suppose that the pulling away of the uterus in any event was a sufficient ground for finding negligence under the first head—that is, at the delivery—whereas the real question was whether in the pulling away of the uterus there was in fact negligence.

The Lord Chief Justice pointed out that Sir Bernard Spilsbury had said that considerable force would be needed to bring away the uterus. He also noticed that Mr. Birkett had used three different terms to describe what had taken place—"pulled away," "came away," and, an intermediate term, "came away in the doctor's hands." Mr. Birkett said that he supposed this was the bias of the advocate adopting the language most favourable to the appellant which came into his mind at the moment. Asked how he himself would have summed up on this point, he said, with great deference, that he would have submitted to the

jury, after pointing out the distinction between civil and criminal negligence, that they should put from their minds entirely any idea of convicting the prisoner merely because the uterus was pulled away. They should be told that this event might happen in the hands of the most skilful operator. The question for them was whether at any stage there was any blameworthy act or omission on the part of the doctor. Counsel then went on to attack the verdict on the ground that it was against the weight of evidence. Here he quoted at length from the evidence given by Dr. Bright Banister, obstetric physician to Charing Cross Hospital, who was called for the defence. Dr. Banister had said that the chance of the recovery of this patient must have been very slight indeed. Asked if he agreed with Sir B. Spilsbury that probably there was a period in the days immediately following the catastrophe when she might have been removed for operation, he replied, "Change 'probably' into 'possibly' and I agree." Dr. Banister said further that the best person to judge as to the desirability of her removal was the doctor in attendance; also that with such a presentation and without manipulative interference there might have been a rupture of the uterus, and that it was a well known fact that the uterus could rupture in the course of perfectly normal labour. With regard to the midwife's evidence that in removing the placenta the doctor gave it a sharp pull, Dr. Banister considered that this might be enough to separate whatever attachment of the uterus was left. Dr. Banister had also said that it would be quite possible for a medical man in removing the placenta to remove the uterus and not be aware that he had done so; if there was a tear of the uterus its edge might be mistaken for the edge of the placenta. Dr. Banister did not agree that great force would be needed to tear the uterus—not more force than might reasonably have been used.

The Lord Chief Justice pointed out that counsel, in examining Dr. Banister, had quoted the midwife as saying "he pulled it [the placenta] sharply," whereas what she actually said was "he pulled it, rather sharply."

Mr. Birkett went on to say that similar evidence was given by Dr. Hubert Roberts, senior obstetric surgeon, Queen Charlotte's Hospital. This expert evidence was of a nature completely to exonerate the appellant. Having regard to the responsible and honourable duties of the medical profession, whose members were called upon to meet emergencies at all hours of the day or night, when an untoward thing like this happened (a thing which occurred with extreme rarity), to declare that the doctor was guilty of manslaughter, although two other doctors of the highest standing in the profession had said that what he did they would have done, was to place all the members of the profession in a very hazardous situation, and one which would deter men from entering the profession. On any ground he was entitled to succeed, but especially on the ground that the verdict was unreasonable and against the weight of evidence. He added that a very distinguished obstetric physician was present in court and would give evidence if their lordships desired, but in view of the Lord Chief Justice's remarks when the original application was made for the admission of further evidence, he could not press for an examination of this gentleman.

This concluded the speech for the appellant, which had lasted nearly three and a half hours.

The Case for the Crown.

Mr. H. D. Roome said that the case for the Crown was well expressed in the judgement which had been quoted in Reg. *v.* Williamson, when Lord Ellenborough said, "a person . . . is not indictable for manslaughter unless he is guilty of criminal misconduct arising either from the grossest ignorance or the most criminal inattention." The two divisions of the present case were illustrated in that judgement. It was said by the Crown that to remove the uterus at all might itself be an act of negligence arising from gross ignorance or gross carelessness. Owing to the extreme rarity of such a tragedy it was put before the jury on behalf of the Crown that they might find that the prisoner must have been either grossly ignorant or extraordinarily careless in not discovering before he had pulled away the uterus that it was not the placenta of which he had hold. Owing to the increased resistance of the uterus he ought to have inferred the true state of things, or at least to have paused for reflection. In the opinion of the witnesses for the Crown he must have used a considerable degree of violence.

The Lord Chief Justice here raised the question of what it was which held the uterus in position. Mr. Roome said that he questioned Dr. Hubert Roberts on that point, and he was proceeding to read his answers, when the Lord Chief Justice remarked that this was in cross-examination of a witness for the defence, and asked whether there was no evidence on behalf of the Crown to show what held the uterus in position. Mr. Roome replied that he did not think there was, but in putting his questions to Dr. Roberts he was acting on expert advice, and Sir Bernard Spilsbury was sitting just in front of him.

Mr. Justice Salter asked if there were not passages in the evidence of Sir B. Spilsbury and Dr. Buchanan expressing the opinion that the removal of the uterus in the circumstances of this case was inconsistent with average care and skill. Mr. Roome replied that that was so.

The Lord Chief Justice: As controversy develops, the perspective changes. Was it a cardinal point in the original case for the prosecution that the fact that the uterus was pulled away involved negligence?

Mr. Roome: The case for the prosecution originally was that it was the subsequent conduct of the defendant which laid him open to a charge of manslaughter.

The Lord Chief Justice: The defendant counters that by saying that his subsequent conduct did not accelerate but in fact delayed the death of the woman. Thereupon the prosecution begins to pay a new degree of attention to this original question of the pulling away of the uterus.

Mr. Roome: It was rather upon the suggestion of the learned judge that both aspects were considered, but more stress was laid by the prosecution upon the second aspect.

The Lord Chief Justice: That is to say, you ended as you began.

Mr. Roome: But there was Sir Bernard Spilsbury's evidence that the uterus required a lot of pulling, also the evidence of Dr. Buchanan. [Counsel here read some of this evidence, which described how the uterus was suspended by the broad ligaments.] It was suggested by the Crown that the mere removal of the uterus in these conditions might, if the jury chose so to regard it, be an act of gross negligence as showing ignorance on the part of the doctor of what he was doing, and the prosecution said that the subsequent conduct of the case showed clearly that the doctor himself thought this was so, because he did not inform the relatives what had happened, he impressed upon the midwife not to tell anybody, he took the uterus home, leaving the placenta behind, and he took no steps to inform anyone at the hospital or to call in another doctor.

The Lord Chief Justice: Is that not rather a perilous line of argument? These things might go to supply a makeweight and make the jury say, "Well, it is shown by his conduct afterwards that he thought it was negligence." But would that alter the character of that which had been done? Suppose that what he did was consistent with quite other views and motives. By bringing in these other things you get confusion of mind, supplementing imperfect evidence, and producing a proof!

Mr. Roome: Much more stress was laid upon the second branch of the case. It was urged that this was no error of judgement. The appellant expected the woman to die, and he said that if she had been dead when he called the next morning he would have given a death certificate.

The Lord Chief Justice: Again supposing that had been so, would it have altered the intrinsic nature of what had been done or omitted?

Mr. Roome: It supplied the motive for what the Crown said was his wicked and criminal inattention.

The Lord Chief Justice: But the question still remains: Was there wicked and criminal inattention? If there was not, you need not trouble about motive.

Mr. Roome: But from the evidence the Crown said that there was. The appellant made no attempt to insert a drainage tube; he omitted to take a second opinion; all that he did was to mention to his locumtenent, on his return to the consulting room, what had happened; he made no attempt to remove the woman to hospital.

The Lord Chief Justice: He says that was good for her.

Mr. Roome: The prosecution says that he did it to prevent anybody from finding out what he had done. When he found out that on the following days she was still alive, and according to the relatives a little brighter, if his object had been to treat his patient in the best way he might have brought a surgeon to her bedside to see whether or not she was fit to be operated on.

Mr. Justice Salter: Supposing he had got a second opinion and taken her to hospital, what is the evidence that her life would have lasted longer?

Mr. Roome: It was hypothetical evidence. In the opinion of the medical men called for the prosecution there was just a chance. Sir Bernard Spilsbury said that he considered she rallied sufficiently to permit of an operation being performed.

The Lord Chief Justice: Does that mean a successful operation? Very often the operation is perfectly successful, but the patient dies!

Mr. Roome: The one chance—a very slender one—of saving or prolonging her life was to have an operation, which might or might not have been successful.

The Lord Chief Justice: That statement involves one view of the facts. Another view was presented—namely, that in the circumstances of this case and in the physical posture in which the patient was lying she was getting at least as efficient drainage.

Mr. Roome: That was the evidence of the appellant himself, and of no other witness. What the Crown contended with regard to drainage was borne out by the two medical witnesses called for the defence.

The Lord Chief Justice then asked what, in all this exceedingly interesting and quite ingenious controversy, became of "proof beyond all reasonable doubt."

Mr. Roome said that it was for the jury, after the judge had ruled that there was evidence to go to them, to say whether they considered the case proved beyond all reasonable doubt.

The Lord Chief Justice: It is for them to say; and it may be for others to say whether they have reasonably said.

Mr. Roome: The jury were urged by the prosecution not to convict this man unless they were absolutely driven to it by the weight of evidence. There was no attempt to snatch a verdict.

The Lord Chief Justice: Nobody would suppose for a moment, Mr. Roome, that you would dream of snatching a verdict. No such thing is suggested.

Mr. Roome went on to say that this case was put particularly high by the prosecution. It was put to the jury that unless they thought that the doctor's conduct was so wicked that they were driven to the conclusion that he was guilty of the grossest inattention towards this unhappy woman they must not convict. What impressed the jury was the callous neglect he showed. He did not call in another doctor, he took the uterus home with him, he concealed the facts of the matter from everybody who might be in a position to give help or advice. Moreover, when he was pressed by the husband to send the woman away, he destroyed the very foundation of his reason now alleged for keeping her at home, and it was when she was weaker that he at last yielded to importunity and sent her to hospital.

The Lord Chief Justice: Suppose—a mere hypothesis—that even at the end of the eleventh hour he had still refused to let her go to hospital, would your criticism have been less or more severe?

Mr. Roome: His conduct would have been at least more consistent. The prosecution do not for a moment accept his story that he was consulting the interest of his patient. Having committed a practically unheard-of blunder, he took every step in his power to conceal it, and that was evidenced by the whole of his subsequent conduct.

The Lord Chief Justice: If that is an accurate representation of the case for the prosecution, the foundation of it was that he made a "colossal blunder" in pulling away the uterus, and that the rest of what happened threw light upon the colossal nature of that blunder. That is not the way in which the case was put at all.

Mr. Roome: Perhaps "blunder" was not the proper word. I should have said "disaster." The case for the Crown was that he was so appalled to think of what he had done that he took steps to conceal it. He wrote to the hospital that the patient had been doing fairly well but was now in a bad way. If the patient had been doing fairly well what excuse was there for not sending her to the hospital long before she was sent? It was not until he was driven to send her to the hospital that he did so. The prisoner had a most fair trial. The jury consisted of men only.

The Lord Chief Justice: That remark seems to suggest that the prisoner could not have had a just verdict if there had been women on the jury. But that might have been an advantage to the prisoner.

Mr. Roome: It was the prisoner's counsel who challenged, successfully, every woman juror who was called.

Counsel went on to submit that there was abundant evidence to support the conviction. Dr. Bateman had been guilty of what Lord Ellenborough described as most criminal inattention.

The Lord Chief Justice asked whether what was meant was that he committed a blunder in taking away the uterus in the belief that he was taking away the placenta, and, having committed the blunder, he proceeded, not to seek to remedy the effects of the blunder, but to conceal the fact of it. Mr. Roome agreed, and the Lord Chief Justice went on to ask whether he would not go a step further and say that he had by reason of that concealment accelerated the death of the patient.

Mr. Roome said that that was one of the points on which the learned judge specially directed the jury. No one could say that the woman would not have died had she been removed to the hospital the next day or the day after. It was idle to say that she could not be removed, for an ambulance was available, and a stretcher to carry her down the stairs. There was a chance, at any rate, of something being done to save her life. The prosecution did not accept entirely the evidence of the two distinguished experts for the defence. These gentlemen never saw this woman, alive or dead, but they came forward with theories which in their view were likely to assist the jury in arriving at a conclusion favourable to the accused.

This concluded the speech for the Crown, which occupied half an hour.

Judgement: Conviction Quashed.

After a consultation, lasting about seven minutes, with his colleagues on the Bench, the Lord Chief Justice announced the judgement of the Court as follows:

> This appellant, Percy Bateman, was convicted at the Central Criminal Court of manslaughter, and was sentenced to six months' imprisonment in the second division. He now, by leave of the Court, appeals against that conviction and that sentence. The Court is of opinion that the appeal ought to be allowed and the conviction quashed. In view, however, of the importance of some, at any rate, of the questions which are raised, we propose to consider our judgement and deliver it on a later date. In the meantime the prisoner is discharged.

Dr. Bateman was then discharged and left the court with his friends.

Obituary.

SIR ANDERSON CRITCHETT, BT., K.C.V.O., F.R.C.S.ED.,

Surgeon-Oculist to the King; Consulting Ophthalmic Surgeon to St. Mary's Hospital, London.

By the death, at the age of 80, of Sir George Anderson Critchett, on February 9th after a short illness, a notable figure has passed from the British medical profession. For many years he had been the doyen of ophthalmic surgeons, and he worthily held the high position he had attained. Until within quite recent weeks he was still at work, displaying all that care and interest in his patients that had marked his whole career.

He might be said to have been born to be an ophthalmic surgeon. He was the eldest son of George Critchett, who was one of a distinguished group of men who, commencing life as general surgeons, broke away to specialize in eye work, and by so doing gave an immense impetus to the study of ophthalmology in this country. Many of these men did their work at the well known general hospitals, some at special eye hospitals. Sir Anderson did his work in the main at St. Mary's Hospital, where he gathered about him a group of students and instilled into their minds a love of the work of his choice.

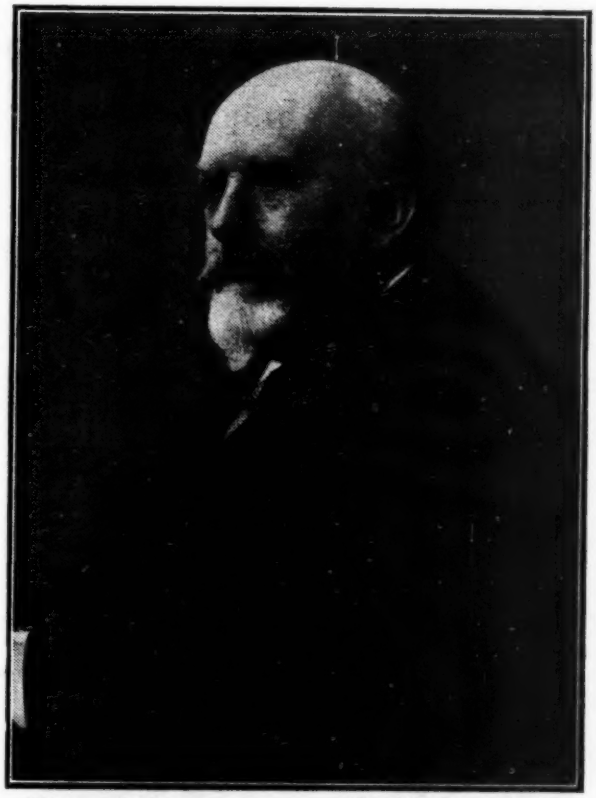
Not only could he look back on a career of over fifty years as an ophthalmic surgeon himself, but he was a link with the founders of modern ophthalmology. Sir William Bowman, Jonathan Hutchinson, George Lawson, and George Critchett were the great names in the ophthalmic world in the sixties and seventies of last century, and Anderson Critchett was approaching manhood at the time when the discovery of the ophthalmoscope produced a renaissance in the study of diseases of the eye. "La réputation d'un père est un lourd fardeau pour le fils." But great though his father had made the name, Anderson Critchett undoubtedly added to its repute, and it is safe to say that there are few names of British ophthalmic surgeons better known in the world at the present time.

He received his early education at Harrow, and retained to the end the greatest love for and pride in his old school. The cheers with which he was greeted when he went to Harrow on Speech Day in the summer of 1908, after he had been made a baronet, gave him more happiness than almost any other recognition of that honour. At Harrow he won the prize for English literature, and though he did not gain a place in the eleven he laid the foundations of a good cricketing style which served him well when, later on, he went up to Caius College, Cambridge. At Caius he captained the cricket eleven and made many friends. He graduated in 1867, and immediately after began to study medicine at the Middlesex Hospital. He qualified in 1872, and there followed a period when it seemed almost doubtful whether medicine or music should claim him. He possessed a fine baritone voice and a love for the drama and social qualities, which all combined to draw him away from the serious profession of medicine. His affection for his father and his desire to be of assistance to him proved an effective counterbalance to these attractions, and he soon devoted himself seriously to the study of ophthalmology. He speedily began to acquire a wide reputation, and it is of interest to note that his first published paper, on inoculation in ophthalmic practice, was published in a French journal—*Annales d'Oculistique*—in 1877.

In 1881 he was elected, out of a strong field of candidates, ophthalmic surgeon to St. Mary's Hospital, and it was his work there that finally established his reputation and incidentally built up one of the biggest eye clinics at any of the general hospitals in London. Critchett himself would have been the first to recognize how much he was aided in his work at St. Mary's by the late Henry Juler; they loyally worked together when, a few years later, Juler was co-opted as his colleague.

His career from this time onwards is a simple record of increasing honours accorded to him. There was scarcely an important office in ophthalmic circles in which he did not take his share of work with the full appreciation of his colleagues, both of his own and of the younger generation. He was vice-president of the Section of Ophthalmo-

logy at the Annual Meeting of the British Medical Association in 1886 at Brighton, and again in 1895 when the meeting was held in London; he was president of the Section in 1889 at the Leeds meeting. To name but a few of the other offices he held: In 1894 at Edinburgh, and again in 1899 at Utrecht, he was elected honorary president of the International Ophthalmological Congress; from 1899 to 1901 he was president of the Ophthalmological Society of the United Kingdom, and of the Ophthalmic Section of the International Medical Congress at the London meeting in 1913. In that great gathering from many nations he displayed a tact in affairs that made him not only the doyen of British ophthalmologists, but a recognized leader amongst eye men of all countries. Not a little of his success in this regard was due to his powers of expression. It is given to few to have had such a command of words as he had, whether in English or French. He became surgeon-oculist to King Edward VII in 1901 and received the honour of knighthood in that year. In 1905 King Edward created him a Commander of the Victorian Order, and in 1908 he was raised to the rank of baronet. In 1912, when a new Section of Ophthalmology was started in the Royal Society of Medicine, he was the first president. In 1918, on the foundation of the new Council of British Ophthalmologists, he was elected the first president of that body. In 1919, in recognition of services to King George V War Hospital, he was made a Knight of Grace of the Order of St. John of Jerusalem, and in the same year was created K.C.V.O. Last year (1924) he was elected Master of the Oxford Ophthalmological Congress, of which body he had previously been honorary treasurer. Thus, apart from the honours he received from the King, he had held every honour it was possible for his colleagues to confer on him. Such a record by itself shows the esteem in which he was held by those best able to judge of his work—an esteem which could only be earned by the genuineness of character which gave rise to it. Among other offices he held that of ophthalmic surgeon to the Royal Academy of Music and to the Actors' Association.



Photograph by [*Russell and Sons, London.*

SIR G. ANDERSON CRITCHETT.

He was never a prolific writer, and to the regret of many of his pupils much of his teaching, which would have been of great value, is lost for want of record, but he was a great clinician, and unrivalled as an operator. To see Critchett in the heyday of his skill removing a cataract was to see the perfection of operative technique. Never a hurried or purposeless movement was made, and if any untoward complication had to be met, it was faced with the same steady placidity as if it had been foreseen from the first. Few attained to the perfection and gentleness of his manipulative skill. He did his work so easily and gracefully that it appeared to be the simplest of performances. There was no sign of display, no hint of showiness or sleight of hand. Every operation that he performed was a perfect piece of work. There could be no doubt that he thought and studied continually to maintain this perfection of technique. It is therefore to be expected that his writings should in the main have dealt with operative procedures, cataract extractions, and the treatment by operation of conical cornea. But to judge of his views it was better to hear him in a general meeting of one of the ophthalmological societies or an Annual Meeting of the British Medical Association; then, in a perfect flow of words, he would give his experience in a manner that made so lively an impression as to be unforgettable. While his communications to society meetings were worth hearing, he was at his best when called upon to do the honours of the occasion in congratulating some colleague upon a success gained or an honour won; then Critchett said the words, and just those sentiments, and in just that manner in which every one of his hearers desired them to be said and would like to have been able to say for themselves. In the teaching of students his habits of work, as well as his words, were contagious and lasting in their impression.

As a man integrity was the hall-mark of his character. As a colleague he was perfect; and he counted amongst his colleagues even the most youthful of the followers of his art and craft. There are not a few who recall with pleasure a few simple words from him that were both a reward for an effort made and a stimulus for further work. To be able to do this we may be sure that Critchett was a happy man, of a courteous breed, with a cultivated largeness of heart, that took pleasure both in his own work and in that of others, and could regard the successes of others not only without envy but with hearty satisfaction.

To few men has it been given to have such a happy and such a full life; happy in his work, happy in his friendships, and happy beyond expression in his family life, he reached the end of his long term of years without ever growing old.

We are indebted to an old friend of Sir Anderson Critchett for the following tribute:

Any dweller in the Cavendish Square district during the last thirty, or even forty, years will miss the presence of the familiar figure of Sir Anderson Critchett. Short but dignified, erect and square-shouldered, clothed with the frock-coat and tall hat of pre-war times, and wearing a muffler well on into the days of summer, his was a well known personality as he strolled along, always leisurely, to his nursing home, his hospital, or, in former years, to watch some cricket at Lord's. Sir Anderson Critchett was the acknowledged doyen of ophthalmic surgeons in this country. He was cradled in the purple. His father before him was the well known ophthalmic surgeon, and he therefore had not to endure the hard struggles and lean years which so many consultants and specialists have had to suffer. Elected at a comparatively early age to the staff of St. Mary's Hospital, he was there associated with such men as Broadbent, Cheadle, Edmund Owen, Field, and Malcolm Morris, all of whom added lustre to its school.

There are doubtless few who have begun so early in life to practise in Harley Street and who have carried on work so long, so unintermittently, and so successfully. During these years he taught and wrote, but it cannot be said that in either of these directions was he as noted as he was for his technical skill and his charming personality. His steadiness of nerve and dexterity of touch permitted of his carrying out cataract operations even in his 80th year. This long-maintained vigour was, possibly, in part, due to his lifelong abstinence from tobacco and wine, though he took the greatest pleasure in supplying the best of both these luxuries to his friends.

His other great claim to remembrance is the affection and regard which he inspired universally with patients and colleagues. His kindness to his junior colleagues was proverbial. He was entirely free from professional envy, hatred, and uncharitableness. His loyalty to those who brought him patients in consultation enabled them to do their best for their clients. This sincerity and uprightness of character gained for him the affection of patients of all classes.

Although so devoted to the practical side of the profession and so esteemed by his colleagues, yet Sir Anderson never

cared to take any prominent place in the academical or administrative life of medicine. Neither did he hanker after any public notoriety. This trait in his character was doubtless due to his intense appreciation of his home and his friends. Of the former this is not the place to write. But it may be recorded that there are few men in recent times who had a larger circle of intimate friends, particularly in the theatrical, artistic, and literary professions. To the writer he once expressed his appreciation of any men who might be called "clubbable," for this adjective, in Dr. Johnson's day, meant a friendly and sociable soul, and not merely a "club-man." His own favourite club, particularly in the golden days of the late Victorian and early Edwardian years, was the Garrick. His intimate theatrical friends were many, and there are few actors or actresses of note who have not enjoyed his hospitality in Harley Street.

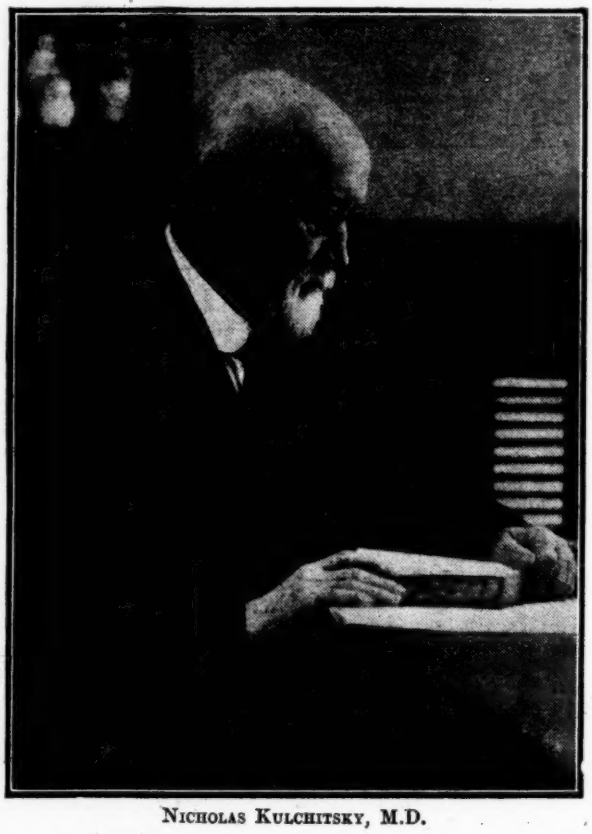
Critchett was blessed with what Antoninus Pius, one of the best and wisest of rulers, summed up as the philosophy of life —*Aequanimitas*. He could suffer fools even gladly, and he never seemed bored. He had a pretty wit, shown, not in the tedious telling of tales which so often passes for humour, but in that bright play of fancy, which is better described by the French as *esprit*. This faculty he used, not for public fireworks, but to cheer his friends and patients. Compared with some of the present-day tendencies towards sensationalism and publicity, Sir Anderson might be regarded as of the old school. His many friends could not wish for higher praise if by the "old school" is meant devotion to family and friends, sincerity in thought and word, generosity and hospitality, cheerfulness and good humour, long years of strenuous work, loyalty to his profession, and entire devotion to his patients. Had he been asked to write his own epitaph I feel sure he would have said: "Write me as one that loves his fellow men," and many to-day can say of him that he was—

> "The dearest friend to me, the kindest man,
> The best conditioned and unwearied spirit
> In doing courtesies."

STC. T.

EMERITUS PROFESSOR NICHOLAS KULCHITSKY, M.D.

ON the morning of January 29th, which was the 69th anniversary of his birth, Professor Kulchitsky was the victim of an accident at University College, as the result of which he died on the night of the 30th. He had acted as a lecturer in histology at University College since 1921.



NICHOLAS KULCHITSKY, M.D.

In 1910, when he had been professor of histology in the University of Kharkoff for thirty years, he retired so as to give younger men a chance of promotion. In spite of the university's appeal for a reconsideration of his resignation he insisted upon his retirement. But he was not idle for long. He soon accepted a position in the Ministry of Irrigation, and then, in 1912, became the representative (curator) of the Ministry of Education in Kasan. In 1914 he was appointed to the same office in St. Petersburg, where he came into personal touch with the late Czar, who in 1915 appointed him a senator, and in 1916 made him Minister of Education, a position he occupied until the revolution.

He was reluctant to refer to his experiences in 1917, when he was seized and imprisoned, but (for some reason which he never quite understood) escaped the fate that befell his brother ministers. He was allowed to return to Kharkoff, where he earned his living by making soap. He used to explain that in the days when he first took to histology it was customary to use soap for embedding tissues, so that the first business of the histologist was to learn how to make soap. Hence in the time of need he had a craft to fall back on and save himself from starvation. He was able to get his family out of Russia in 1918 after walking all the way from Kharkoff to Sebastopol, which took twenty-two days. But he stayed in Russia for another three years in the hope that his services might be useful to his country.

When he arrived in London in 1921 he was penniless. He was taken on to the staff of the Anatomy Department at University College as a lecturer in histology, and, with the help of a grant from the Medical Research Council, he began the study of nerve endings in muscle, which in 1881 had been the subject of the first of his extensive series of contributions to histological literature.

In 1921 Professor Boeke gave a lecture in London on his researches on nerve endings in striated muscles, and brought his specimens to University College, where he gave a private demonstration in the Anatomy Department. His results differed from those obtained by previous observers. Hence it was suggested to Professor Kulchitsky that he should investigate the whole subject anew. His work has had momentous results, because John Irvine Hunter, who was working at University College in 1922, got from Kulchitsky's preparations the ideas for the researches described in the BRITISH MEDICAL JOURNAL of January 31st. Kulchitsky described two kinds of efferent nerve endings in striated muscle —one connected with non-medullated, the other with medullated nerves. He was unable to discover a single example of both kinds of nerves going to the same muscle fibre.

Kulchitsky's memoir was published in the *Journal of Anatomy* of January, 1924. The night before his fatal accident he completed the manuscript of a memoir on the nerve endings in the lizard's muscles, and instructed his daughter that it was to be dedicated as a tribute to the memory of his young friend John Hunter.

More than a quarter of a century ago Kulchitsky's name became familiar to all neurologists by reason of the widespread adoption of his modification of Weigert's haematoxylin staining method for myelin. But he has a long record of achievements in histology, including textbooks of histology and microscopical technique, both of which passed through five editions between 1902 and 1912.

In addition to the distinction of being a Russian senator and an emeritus professor of Kharkoff University, he was a Commander of the Legion of Honour, a Privy Councillor of Russia, a corresponding member of the Imperial Academy, and an honorary member of the Anatomical Society of Great Britain and Ireland.

His technical achievements in histology were superb; and during the last three years it was a cheering sight to see the courtly old man, who had weathered such terrible anxieties, peacefully enjoying the triumphs of his own technical skill and experience.

G. E. S.

THE LATE SIR JAMES MACKENZIE.

THE funeral of Sir James Mackenzie, M.D., F.R.S., took place at Golders Green Crematorium on the morning of Thursday, January 29th. The service in the chapel was conducted by his nephew, the Rev. D. R. M. Keir of Perth. Besides the widow, Miss Mackenzie, Sir William Mackenzie, K.C., and other members of the family, the congregation

included Sir Charles Sherrington, G.B.E., M.D. (President of the Royal Society), Sir W. Arbuthnot Lane, Bt., Sir James Purves-Stewart, Sir Thomas Parkinson, and Dr. Percy Kidd. Professor David Waterston and Mr. John Adamson represented the St. Andrews Institute for Clinical Research. The British Medical Association and its Burnley Division were represented by the Deputy Medical Secretary, Dr. G. C. Anderson; the BRITISH MEDICAL JOURNAL by the Assistant Editor, Dr. N. G. Horner. After the cremation the ashes were placed in an urn and deposited in the columbarium at Golders Green.

We regret to announce the death of Dr. WILLIAM MANSON FERGUSSON, on January 24th, at the age of 41. Some weeks ago he and his whole household, including his professional assistant, were attacked by typhoid fever. Dr. Fergusson's attack was very severe and attended by complications. He was removed to a nursing home in Aberdeen, where he died. Dr. Fergusson was born in Banff and educated at Banff Academy, Aberdeen, Dublin, and London. He graduated M.B., Ch.B.Aberd. in 1905, obtained the diploma L.M. in 1906, and proceeded M.D. in 1911. His appointments included those of clinical assistant to the Hospital for Women in Soho Square, and junior assistant to the Royal London Ophthalmic Hospital. In 1906 he joined his father in medical practice in Banff. Since 1912 he had been surgeon to Chalmers Hospital, Banff, after six years' preliminary work as assistant surgeon, and took a leading part in the development of that institution. He was assistant visiting surgeon to Banff District Asylum, and lecturer and examiner to the British Red Cross Society. In 1907 he received a commission as surgeon lieutenant in the 1st Banff Royal Garrison Artillery, and in August, 1914, he was mobilized as captain in the R.A.M.C.(T.F.). Although invalided out in 1915, he rejoined with the rank of captain in 1918. After being medical officer in charge of the auxiliary hospital at Banff, he served in France in 1918. He was chairman this year of the Banff, Elgin, and Nairn Division of the British Medical Association. He published several papers on gynaecology and surgery in the BRITISH MEDICAL JOURNAL, and in the *Journal of Obstetrics and Gynaecology of the British Empire* an article on the history, technique, uses, and dangers of ventrofixation. The high esteem in which Dr. Fergusson was held as the result of his outstanding ability as a surgeon was shown by the large number who attended his funeral on January 27th. The British Medical Association was represented by the Divisional Secretary, Dr. G. S. Sowden, and Drs. R. Douglas and S. C. Ironside, members of the Divisional Executive Committee. He leaves a widow, to whom, on behalf of the profession, we tender sincere sympathy.

Dr. JOHN DEWAR of Hampstead, who was knocked down and killed by a motor car on January 31st while on his way to visit a patient, was the chief of the Clan Dewar. He was born at Perth in 1844, and was educated at Anderson College and Glasgow University. In 1866 he obtained the diplomas L.R.C.P., L.R.C.S.Edin., and L.M., and shortly afterwards entered into partnership with Dr. J. P. Scatliff, whose daughter he married in 1874. For over thirty years Dr. Dewar practised in Sloane Street, London, and subsequently at Hampstead. He was formerly senior surgeon to the Hospital for Women and Children in Vincent Square, and surgeon for diseases of women and children to the Chelsea, Brompton, and Belgravia Dispensary. He was the editor for some time of the *Nursing News and Hospital Review*, and the author of several small popular works on diet and infant management. He contributed articles on gynaecology to the BRITISH MEDICAL JOURNAL and other periodicals. Dr. Dewar was a strong Presbyterian and had held office as an elder for many years. He was a member of the British Medical Association. He leaves a widow, a daughter, and four sons, one of whom is practising medicine.

Dr. BANTI, professor of morbid anatomy in the University of Florence, who had given his name to a form of splenic anaemia, has recently died.

Universities and Colleges.

UNIVERSITY OF LONDON.

UNIVERSITY COLLEGE.

THE introductory medical course for students who have matriculated in the University of London will begin at University College on Monday, March 2nd. Intending students should apply at once, and should attend at the College on Monday, March 2nd, at 11 a.m.

NATIONAL UNIVERSITY OF IRELAND.

ON Saturday, February 7th, the following degrees in the Faculty of Medicine were conferred in the hall of University College, Dublin:

M.B., B.Ch., B.A.O.—T. D. Donegan, G. A. Busby, B. J. Carlin, Jane Carraher, Mary Courtney, R. J. Cullen, V. P. Donohoe, Hilda M. Doyle, M. Finn, A. C. Francis, J. Griffin, C. Hannigan, M. J. Harte, L. A. Hayes, T. Hill, C. E. Hurley, B.A., J. Kennedy, B.A., J. B. Lynch, Mary M'Givern, Josephine M'Govern, P. E. M'Kernan, M. P. M'Manus, M. MacSweeney, Violet B. Madden, J. S. Mahony, J. G. Molony, M. P. Moriarty, T. Murphy, Margaret M. Nolan, B.A., A. O'Donovan, M. A. O'Dwyer, Margaret O'Farrell, J. P. O'Kane, J. J. A. O'Leary, D. J. O'Regan, E. O'Reilly, D. Rafferty, Ita Ryan, J. Sexton, Jerh. Twohill, J. Walsh.

ROYAL COLLEGE OF PHYSICIANS OF IRELAND.

AT the monthly meeting of the President and Fellows, held on Friday, February 6th, the following candidates, having duly passed the required examination, were admitted as Licentiates in Medicine and Members of the College: Cyril James Ussher Murphy, M.B., B.Ch., B.A.O.Dubl.; M.D.; William Thomas Noonan, M.B.Toronto.

At a special meeting held on Saturday, February 7th, Sir Humphry Rolleston, Bt., K.C.B., President of the Royal College of Physicians of London, was the recipient of the Honorary Fellowship of the College. After the ceremony of conferring the honorary fellowship, Sir Humphry delivered an address on "Individual links between the Royal Colleges of Physicians of London and Dublin" (see page 327).

Medical News.

IT will be remembered that on two previous occasions parties of medical men from other countries have visited Great Britain to study British public health services. A third party, now in this country, was received on February 8th by the Society of Medical Officers of Health, addresses of welcome being given by Professor Kenwood and Colonel S. P. James, of the Ministry of Health. On February 9th the party was received by Mr. Neville Chamberlain at the Ministry of Health, when an address was given by Sir George Newman on English public health administration. Later in the day the company divided into three groups, one going to Wolverhampton and district, another Leeds and the West Riding, and the third Willesden and Middlesex. The party will leave this country on March 24th for the closing conference at Geneva. The visits are arranged by the Health Organization of the League of Nations, with the financial assistance of the Rockefeller Foundation. Similar visits have been paid in other years to Italy, Belgium, Austria, Holland, Denmark, Switzerland, and the United States.

DR. J. R. KAYE, the County Medical Officer for the West Riding of Yorkshire, has been elected President of the Association of County Medical Officers of Health for England and Wales.

A CHADWICK public lecture on international hygiene will be delivered by Dr. E. W. Hope at the Medical Society of London, 11, Chandos Street, Cavendish Square, on Monday, February 16th, at 5.15 p.m., with Sir James Crichton-Browne, M.D., F.R.S., in the chair. On Monday, March 9th, at 8 p.m., in the Inner Temple Hall, Lord Newton will give an address on the necessity for legislation with regard to smoke abatement, with Sir William J. Collins, K.C.V.O., M.D., in the chair. In May Professor Brumpt, of the faculty of medicine in the University of Paris, will give two lectures (in English): (1) how to conduct an antimalarial campaign, and (2) the prophylaxis of sleeping sickness. On June 11th, at 5 p.m., in the Chelsea Physic Garden, Sir Daniel Hall, K.C.B., F.R.S., will discourse on the sources of the fruit and vegetable supply of London. Admission to all Chadwick public lectures is free.

DR. ROWLAND L. THOMAS of Whitland has been appointed coroner for West Carmarthenshire.

THE annual county medical dinner organized by the West Riding Local Medical and Panel Committee will be held at the Hotel Metropole, Leeds, on Tuesday, March 31st, at 6.30 for 7 p.m., when the chair will be taken by Sir Berkeley Moynihan, Bt. Tickets 12s. 6d. (exclusive of wine), to be obtained from Dr. W. Eardley, 50, Burlington Crescent, Goole.

A LECTURE on modern atmospheric conditions will be given before the Royal Society of Arts on Wednesday next, February 18th, at 8 p.m., by J. S. Owens, M.D., A.M.Inst.C.E., superintendent, Advisory Committee on Atmospheric Pollution, Air Ministry. Dr. Owens has written on the rate of settlement of solids in water as well as on atmospheric pollution.

THE Fellowship of Medicine announces that on February 20th Sir James Dundas-Grant will lecture on some points in the diagnosis and treatment of tuberculosis and cancer of the larynx, at the Royal Society of Medicine, at 5.30 p.m. Beginning on February 16th, a fortnight's course in medicine, surgery, and the special departments will be held at the Prince of Wales's Hospital, Tottenham. In the mornings there will be demonstrations of modern clinical methods; in the afternoons demonstrations of groups of selected cases and clinics in the various hospital departments; and at 4.30 p.m. each day there will be a special clinical lecture. The opening lecture of the course will be given by Mr. James Sherren on appendicitis. On March 2nd a three weeks' course in medicine, surgery, and gynaecology will commence at the Royal Waterloo Hospital, and include heart disease and diseases of the nervous system, the blood, and the breast. A four weeks' afternoon course in ophthalmology will begin on March 9th at the Central London Ophthalmic Hospital; an operative surgery class will be held by arrangement for an additional fee. The Chelsea Hospital for Women is arranging a special three weeks' course from March 16th. At the Hospital for Diseases of the Chest (Brompton) a fortnight's course begins on March 16th. The Royal Northern Hospital, in conjunction with the Royal Chest Hospital, is arranging an intensive course in medicine, surgery, and the special departments from March 23rd to April 4th. Copies of the syllabuses of these courses may be obtained from the Secretary of the Fellowship at No. 1, Wimpole Street, W.1.

IRISH newspapers announce that Dr. T. Hennessy, Irish Medical Secretary of the British Medical Association, has accepted the invitation of the Government of the Free State to become a candidate for election to the Dail for South Dublin City.

ON and after April 1st next grants made to health visitors will be paid by the Minister of Health instead of the Board of Education. The circular letter in which this change is announced states that on and after April 1st, 1928, the appointment of a woman for the first time to be a health visitor will not be approved unless she has obtained a certificate granted by a central examining body approved by the Minister.

AT the meeting of the Nottingham Mental Dispensary Committee, held on January 28th, the town clerk reported that the Board of Control had approved the purchase of Aston Hall and park, comprising 88 acres, and about 56½ acres of adjoining land to be used as a home for mental defectives. The institution will, it is hoped, provide accommodation for 400 beds and a resident staff.

AT the meeting of the West Kent Medico-Chirurgical Society at the Miller General Hospital, Greenwich, to-day (Friday, February 13th), at 8.45 p.m., Dr. Harold Pritchard will read a paper on some modern aspects of disease.

THE nave of Epsom College War Memorial Chapel will be consecrated by the Bishop of Winchester (visitor of the College) on Saturday, February 21st, at 3 o'clock. Contributors to the war memorial fund who wish to be present at the ceremony should apply for a card of admission to the Bursar, Major Walter L. Giffard, the College, Epsom, Surrey.

MESSRS. MANN, EGERTON AND CO., LTD., have made for Daimler Hire Limited a very luxurious ambulance body for a 45-h.p. Daimler chassis. Special attention has been given to ease of loading and the comfort of the patient's bed, and for his removal from his room folding carriers are provided. Two chairs are fixed for attendants. In addition to lockers there is a wash basin with water supply. Attention has been given to the ventilation and lighting of the body. One aim the makers kept in view is that the ambulance when travelling shall resemble an enclosed limousine.

THE twentieth International Congress of Anatomy will be held at Turin from April 6th to 8th under the presidency of Professor G. Romiti. Titles of papers should be sent to Professor G. Levi, Istituto Anatomico, Corso M. d'Azeglio 52, Turin.

AT the meeting of the Medico-Legal Society to be held at 11, Chandos Street, W.1, on Tuesday next, February 17th, at 8.30 p.m., Dr. Godfrey Carter will read a paper on the psychology of the criminal, which will be followed by a discussion.

WE hope to publish next week a memoir of Dr. E. E. Klein, F.R.S., the eminent bacteriologist and histologist, whose death at the age of 80 is announced as we are going to press.

Letters, Notes, and Answers.

ORIGINAL ARTICLES and LETTERS *forwarded for publication are understood to be offered to the* BRITISH MEDICAL JOURNAL *alone unless the contrary be stated.* Authors desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Financial Secretary and Business Manager, 429, Strand, W.C.2, on receipt of proof.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names—not necessarily for publication.

ALL communications with reference to advertisements as well as orders for copies of the JOURNAL should be addressed to the Financial Secretary and Business Manager, 429, Strand, London, W.C.2. Attention to this request will avoid delay. Communications with reference to editorial business should be addressed to the Editor, BRITISH MEDICAL JOURNAL, 429, Strand, W.C.2.

Communications intended for the current issue should be posted so as to arrive by the first post on Monday or at latest be received not later than Tuesday morning.

THE telephone number of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is Gerrard 2630 (Internal Exchange). The telegraphic addresses are:

EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology Westrand, London.*

FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate Westrand, London.*

MEDICAL SECRETARY, *Mediocre Westrand, London.*

The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin*; telephone: 4737 Dublin), and of the Scottish Office, 6, Rutland Square, Edinburgh (telegrams: *Associate, Edinburgh*; telephone: 4361 Central).

QUERIES AND ANSWERS.

SNORING.

"WILTSHIRE" writes: Can any reader of the BRITISH MEDICAL JOURNAL kindly advise how to prevent snoring in adult life? The patient, a man aged 50, healthy, has no nasal obstruction, is not a mouth-breather, and only recently acquired this habit.

HOUSE DUTY.

"T. D. H." writes: I pay £100 a year rent for my house; I am allowed £50 by the Inland Revenue, but I have to pay house duty on the £100. Is that right?

*** Yes, it is correct, though the reference is presumably to the house duty chargeable for 1923-24 and prior years, as it has been abolished as for 1924-25 and onwards. The point is that whereas house duty—and income tax under Schedule A—is, like local rates, chargeable on the premises as a whole, the amount of rent to be allowed as representing a professional expense is determined by the portion of the premises used for professional purposes.

LETTERS, NOTES, ETC.

THE INACCURATE ANTIS.

DR. W. D. O'KELLY (Department of Pathology and Bacteriology, University College, Dublin) writes: My attention has been drawn to an article in the *Vaccination Inquirer* of February 2nd by the receipt through the post (anonymously from London) of a marked copy of this publication. The article in question refers to a discussion on the value of the Schick test at a recent meeting of the Section of Pathology of the Royal Academy of Medicine in Ireland. I write to say that the account of my remarks given in the article in question is inaccurate and misleading.

INFLUENZA.

SURGEON COMMANDER LLEWELLYN LINDOP, R.N., writes to suggest that in influenza the point of infection is the eye, and that the cough-spray, reaching the conjunctival sac, incubates there and infects the nose by way of the lacrymal duct. He thinks, further, that infection of the respiratory tract is by contiguity of tissue, and that the risk of infection would be diminished if persons travelling in trams, buses, and tubes, in reach of infected coughers, could be persuaded to wear well fitting motor goggles. An ordinary pair of horn spectacles would, he says, be better than nothing, but would not cut off lateral splash.

VACANCIES.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 34, 35, 36, 37, 40, and 41 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 38 and 39.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page 63.